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LOW-COST ALTERNATE HOUSING FOR MONTANA

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LOW-COST ALTERNATE HOUSING FOR MONTANA

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Organization (AERO)
Billings, Montana

Human Resources Division
Department of Community Affairs
Helena, Montana

Designed and Prepared by

Architectural Projects and
Research Office of the
School of Architecture
Montana State University
Bozeman, Montana
under the direction of
Ilmar Reinvald, AIA, with
Samuel Hyatt and Ron Eagleston
with special assistance from
Dr. George McClure,
Dr. Ifan Payne,
Skip Schloss,
James P. Twomey and
Stephen Potters
Project Coordinator:
John Schwechten

September 1975

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The photo illustrations used in this book are of the sod houses featured in the July/ August 1975 issue of Abitare.

Photographer, Elaine Crywell

"In order to redesign a new distributional mechanism, it will also be necessary to shed some of the market system's basic philosophical and social assumptions. First, the notion that man is an infinite desirer of utilities, an infinite appropriator and consumer; second, that inequality is necessary for incentive."

- A. Daniel Burhans

TO THE SPONSORS AND USERS OF THIS BOOK

Material shortages. Energy crises. Inflationary spirals. These are terms common to us now, a part of the American vernacular.

Yet solutions seem to defy us. They are elusive; partly because of our reluctance to introduce change, real substantive change, in our lifestyles.

But many solutions are available. What we need to do is recognize and then embrace them.

This book is an attempt at presenting a solution (notice I didn't say THE solution) to a very real need.

With the nearly astronomical rise in housing construction costs in recent years and the certainty of more utility rate increases associated with maintaining a home, we are confronted by the need to design and build low cost and energy efficient housing in Montana.

Low Cost Alternative Housing for Montana is a first step toward that end. The solution lies with both the book and the building of houses.

This is a user's manual. Use it. Build houses from it and advocate for others to do the same. Perhaps this will cause more attention to be paid to our housing needs in Montana. And, it is hoped, that will lead to the construction of more affordable housing--housing that is truly low cost and energy efficient.

John Schwechten
Project Coordinator

INTRODUCTION

The house designs illustrated in this publication are offered as proposed alternatives for low-cost housing. These buildings are low-cost both because of low initial cost, but also more importantly because of low cost-in-use. The latter is achieved through low energy use for heating and cooling the buildings.

It is intended that these houses provide an alternative to mobile home living.

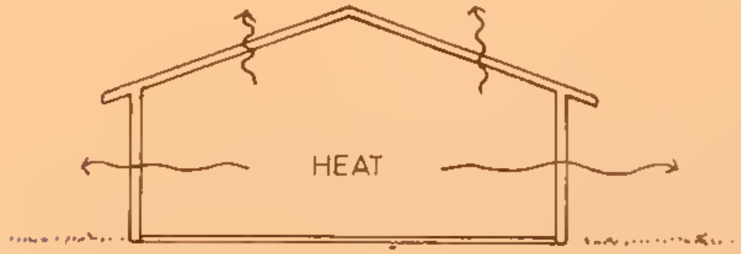
The appearance of the houses may at first glance seem untraditional because they are sunk halfway into the ground. This important design element occurs because of the need to conserve the energy used during the life of the building. Instead of the heat generated within the building being lost by transmission through the walls, windows and roof, as is the case with conventional houses; the ground (and sod roof) in these present designs store the heat and provide an almost infinite insulation barrier to the wide swings in external temperatures encountered in Montana.

The stable underground thermal conditions give rise to considerable savings in energy use throughout the occupancy of the house. And the design is not as untraditional as it may seem. The thermal properties of the ground have been used for thousands of years in in-the-ground houses in Europe, Africa, Asia, the Pueblo houses (mud) of the U.S., and of course our own root cellars make use of the stable thermal conditions underground.

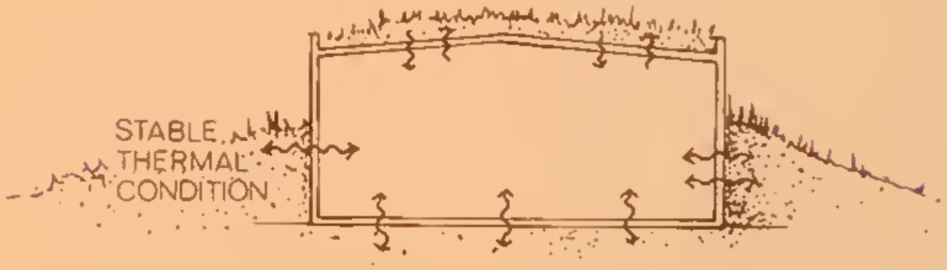
Illustrated are:

1. Prototype concrete block house for a flat site.
2. Prototype concrete block house for a sloped site.
3. Variations on these designs in materials indigenous to Montana: stone, log, and wood sloped house.
4. Modifications for existing mobile homes.

One final point should be borne in mind. A generous use of planting and landscaping can also cut down considerably on utility bills by protecting a house from cold winter winds, and from the hot south and west sun.



CONVENTIONAL HOUSE



PROPOSED ALTERNATE HOUSES

GETTING THE HOUSES BUILT AND THEIR COST

Building costs go up between 10% and 15% every year. In 1975, with careful shopping, planning, and doing most of the work yourself, you could build one of these houses for about $8,000. It would probably be very advantageous to form community groups that have interest in building low-cost houses. With a group effort, it is possible to get discounts by buying materials in large quantities. The work can be done with less effort and more efficiently by pooling skills. It is also a lot more fun to work this way. One might also think about setting up informal trade routes for native materials. For instance, a community group from Western Montana might wish to trade lumber for native stone from Eastern Montana. It is very strongly advised that before you begin building, you check your plans with an architect or engineer in your area to insure that this design meets the local soil, wind, snow and earthquake conditions.

New materials should be used for the structure (concrete, block, beams, joists, posts, reinforcements, etc.), wiring and plumbing. It is not worth taking chances with the life and safety of the occupants of your house by saving a few dollars and having the building collapse. suffer through electrical shorts or leaky plumbing.

Recycled materials can be used for interior finishes, doors, windows, appliances, bathroom fixtures, furniture, etc., usually at considerable savings. The used materials should, however, be carefully examined for faults and adaptability prior to use.

The following is a material cost breakdown if only new materials were used. The figures for electrical and plumbing work are based on labor and materials done by professional plumbers and electricians. You will need to adjust these figures to your local conditions and make allowances for traded or recycled materials.

Material Cost Based on 850 Square Foot House

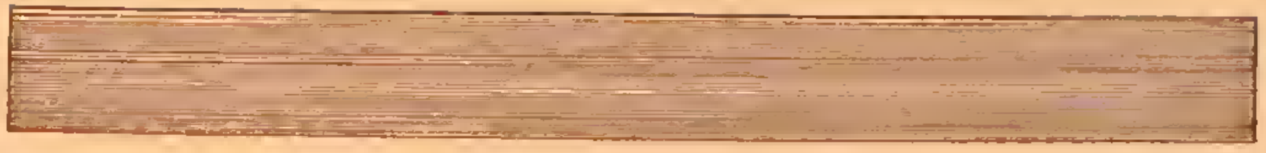
FLOOR	
Concrete Slab & Footings	$ 250.00
Plywood Subfloor on Sleepers	50.00
WALLS	
Concrete Block Walls (or log)	450.00
Bond Beam	90.00
Glass Block	500.00
Windows (wood)	500.00
Doors (prehung birch)	300.00
Hardware	100.00
Partition Framing	200.00
Paneling (aromatic cedar ply)	500.00
ROOF	
Roofing	500.00
Beams & Columns	200.00
Insulation (1" Fib)	100.00
APPLIANCES	
Bath, Kitchen, Stove/Fireplace (installed)	3000.00
MISC.	400.00
Total	$ 7080.00
	or $ 8/ sq. ft.

Labor & Material Based on 850 Square Foot House

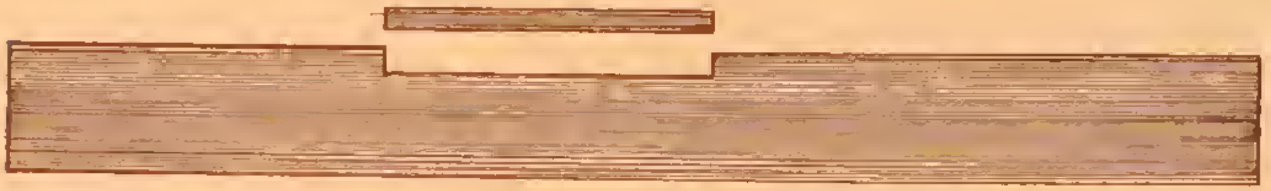
ELECTRICAL	$2.50/sq. ft.	$2000.00
EL. HEAT	$1.50/sq. ft.	1200.00
PLUMBING	$3.50/sq. ft.	3000.00
	Total	$13280.00
		or $16/sq. ft.
Substitute oil heat + $1000.00		$14280.00
		or $17/sq. ft.

HOUSES A,B,C.

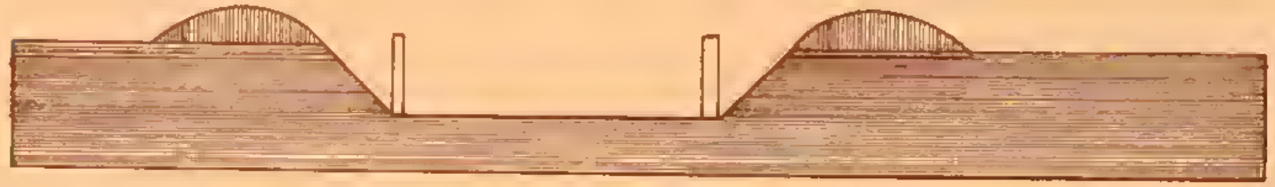
flat site
sloped site
addition



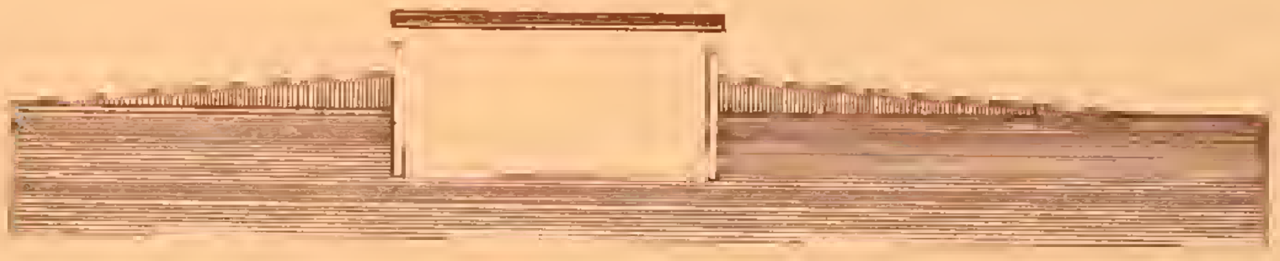
1 EXISTING LAND



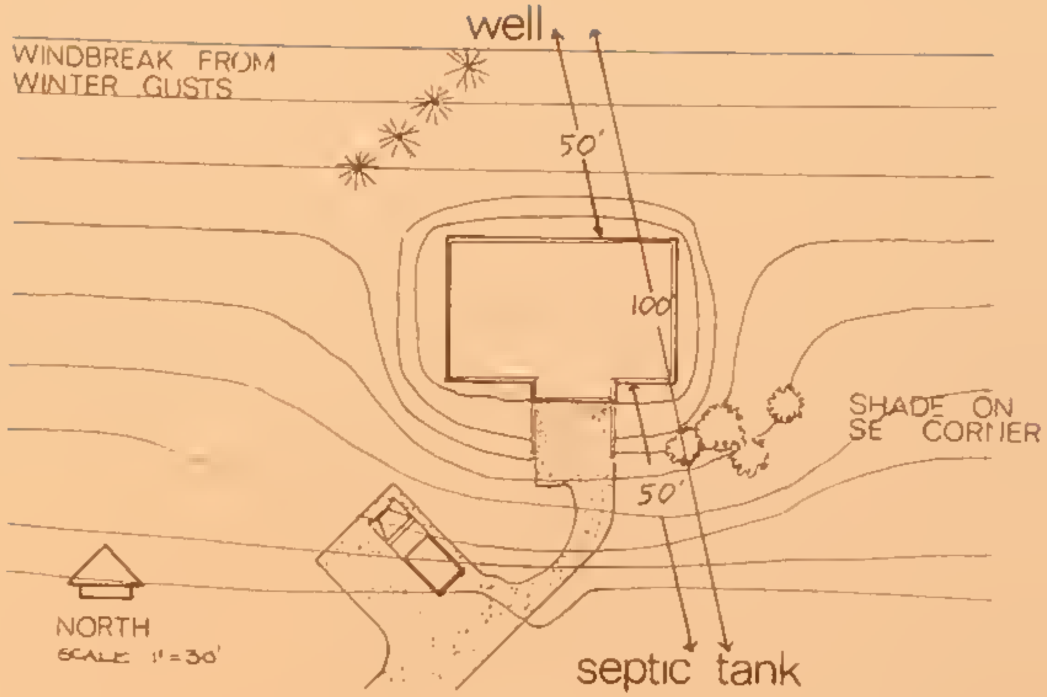
2 EXCAVATE, SAVE TOPSOIL, SOD AND PLANTS



3 CONSTRUCTION



4 PLACE SOD ON ROOF, BERM WALLS, LANDSCAPE



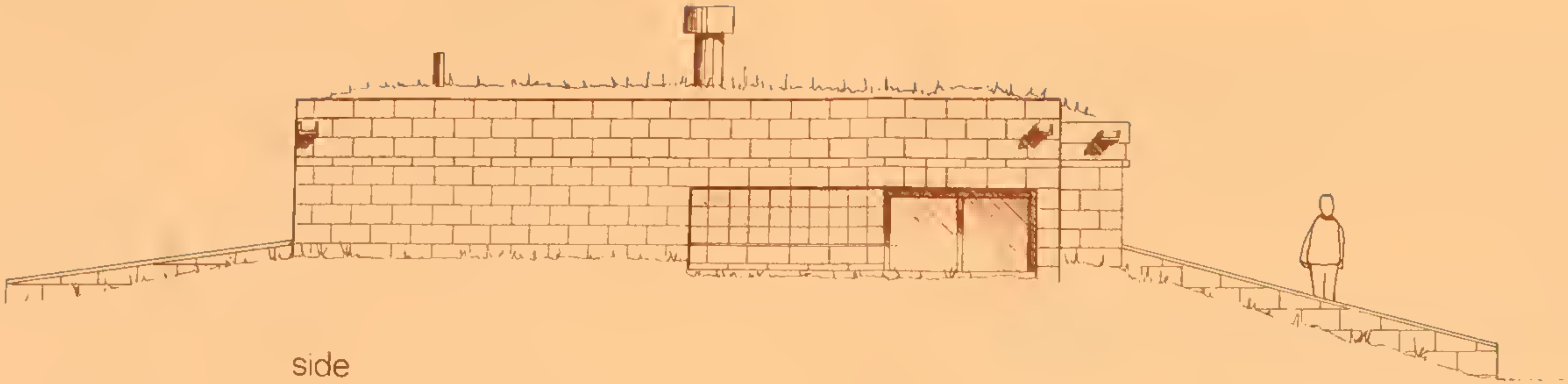
site

This building is designed for a typical flat and slightly sloping site. Site selection should include soil tests for bearing and drainage properties for septic systems. This soil test can be done by any qualified architect, engineer, or county soil extension agent.

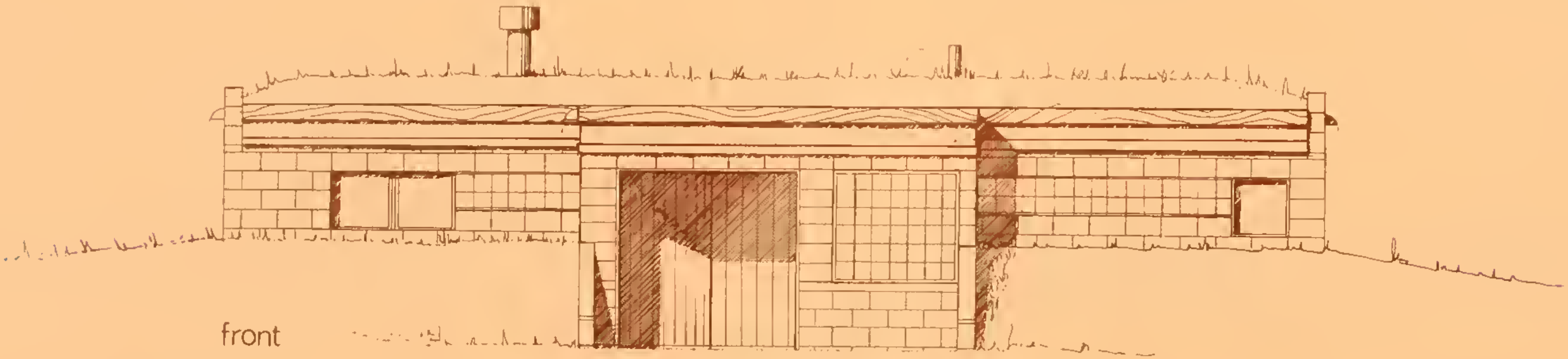
In planning the location of the utilities, it should be remembered to situate the well up hill from the house on a slight slope at a distance greater than or equal to 50'. Also the distance between the well and the septic field should be at least 100' to ensure against contamination of the well. The septic field should be at least 50' from the house.

A respect for the land was a design condition. As can be seen in the site diagram, this was achieved by reusing all the soil. In doing this, natural insulation is gained from the earth while showing respect to the land. By reusing the natural materials displaced by the building and allowing the natural growth, the land continues producing oxygen and cleaning the air.

HOUSE A, flat site

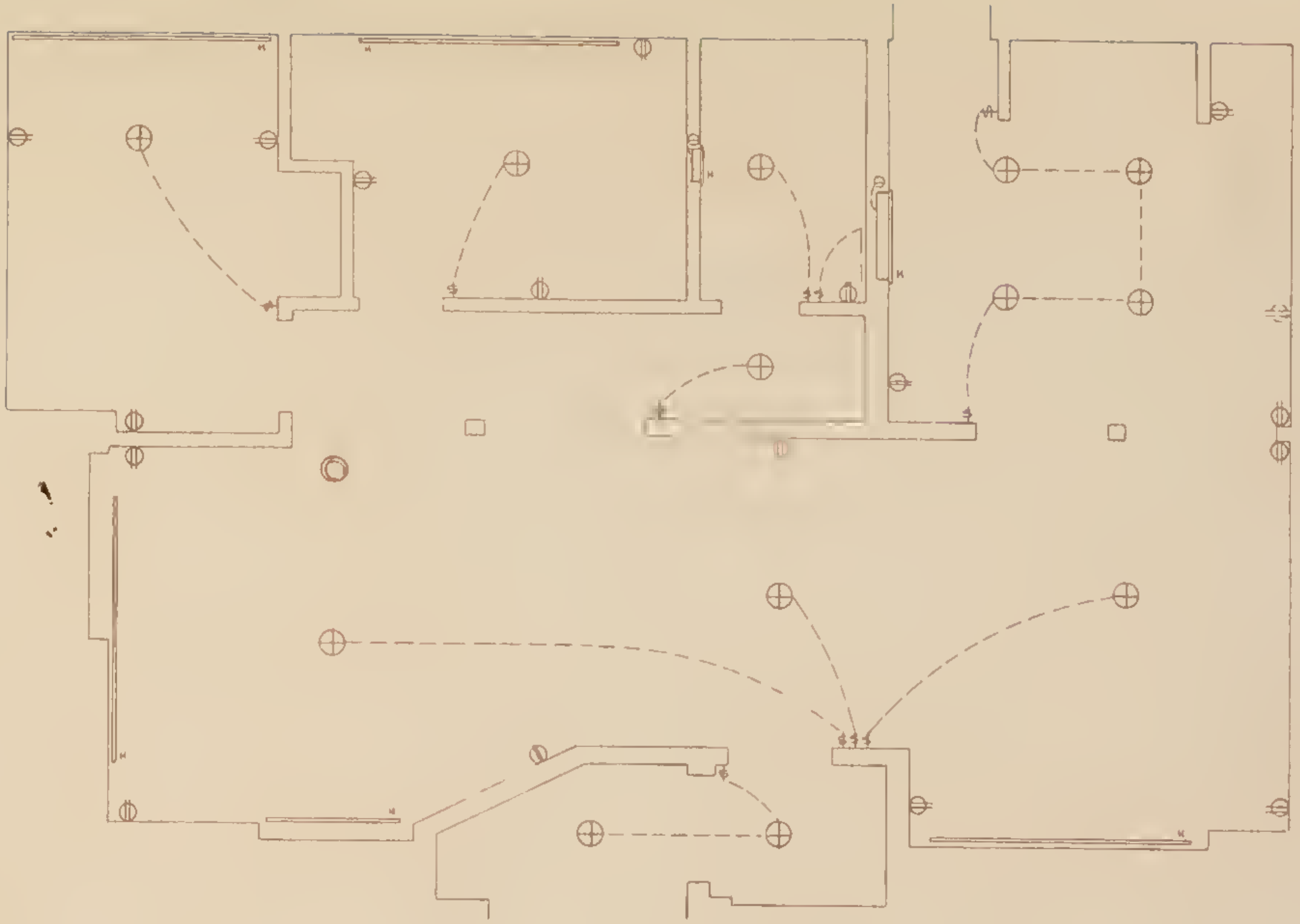


side



front

elevation



key

⌽ ⦶ outlet

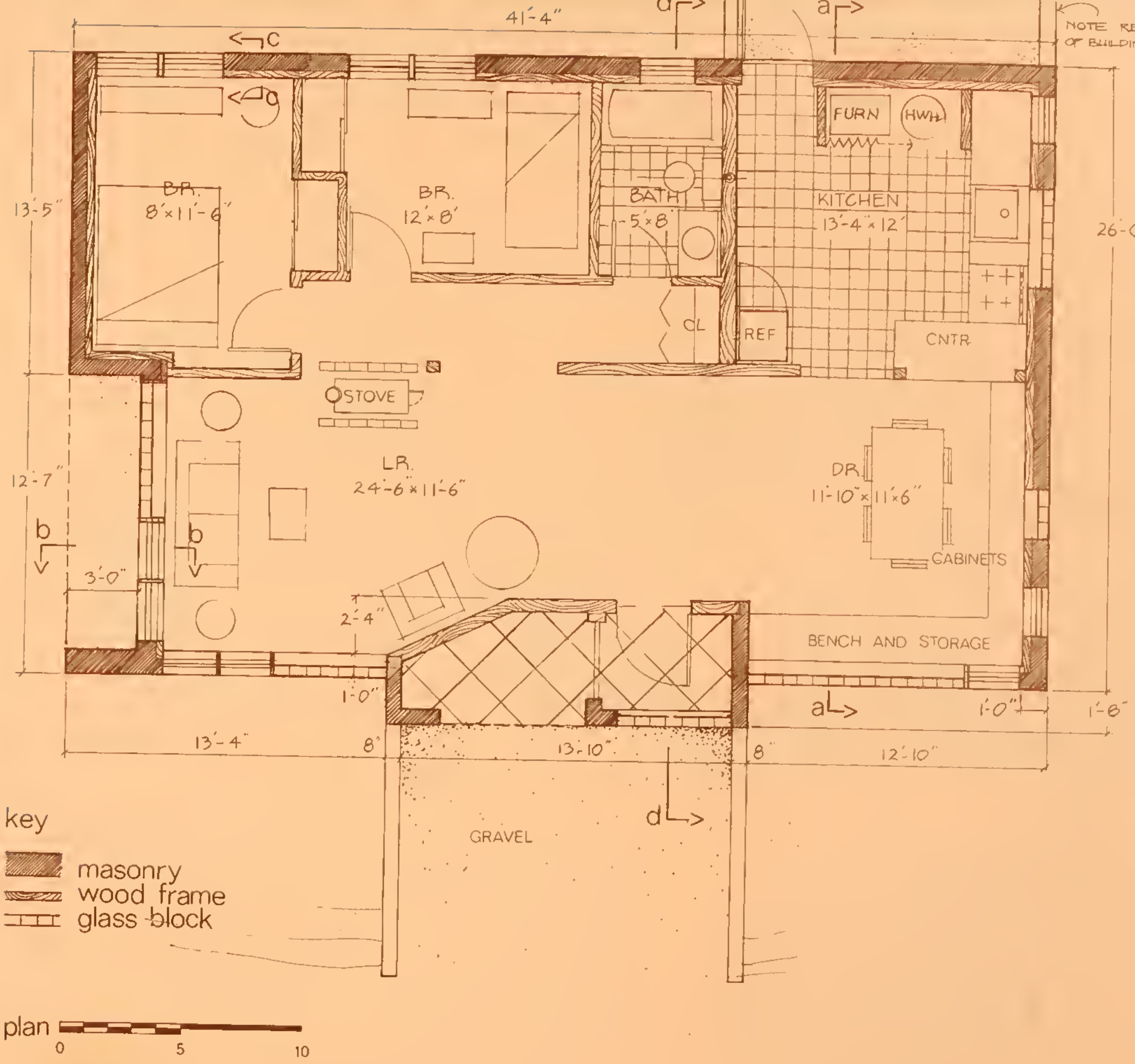
ϟ switch

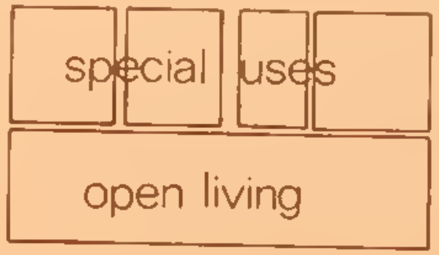
⊕ light

═ heater

NOTE: FOR MINIMUM PIPE SIZES AND
TYPES OF CONNECTIONS, SEE YOUR
LOCAL PLUMBING CODE OR THE NATIONAL
PLUMBING CODE.

electrical and heating

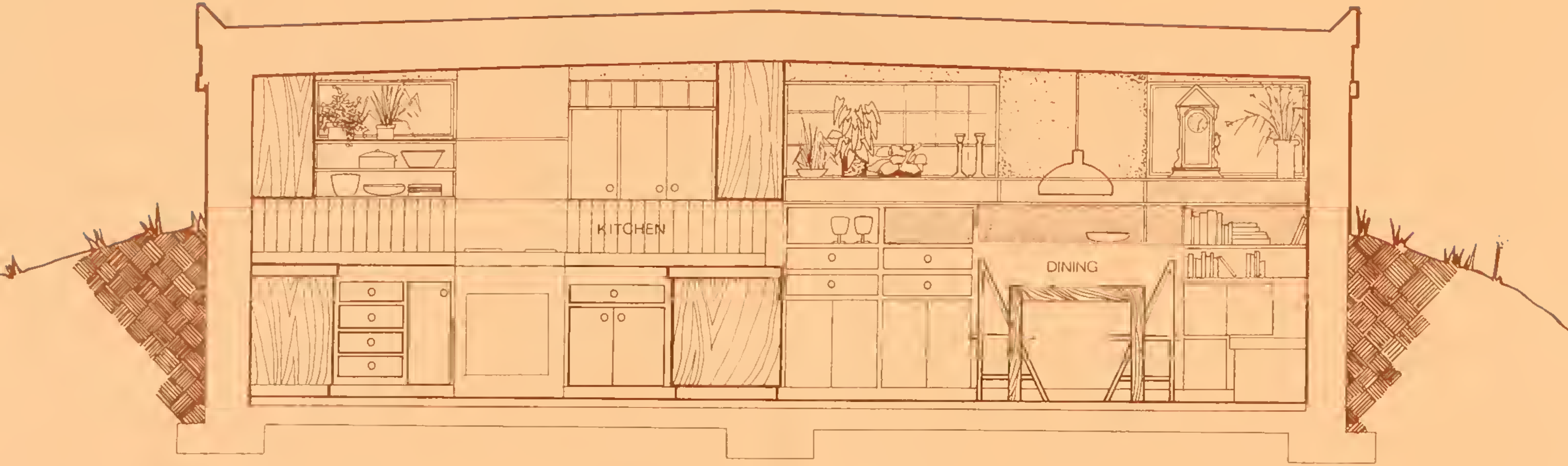




This house is designed to give the occupant a comfortable and enjoyable home of a reasonable size. To achieve this the rooms are laid out efficiently using an open plan. In this way, space that is traditionally lost to compartmentalized uses becomes part of the living area. Space is also saved by minimizing the use of corridors and "dead" spaces.

Flexibility is obtained by dividing the plan into halves, one the living space, the other the closed special function areas (and those restricted by plumbing). When changes are required, linear expansion occurs in the longitudinal direction. As more sleeping space is added a proportionate amount of living space can also be added. All structural support is carried by the exterior walls and the center beam on columns. This leaves the interior walls structurally free to be moved for interior modifications.

The entrance serves the function of giving the interior protection from direct drafts and providing inside/outside mud areas with storage for boots, coats, etc. The glass block in this area provides natural light while retaining privacy from the outside. The entrance area can also serve as a patio and extended living space in warm weather.



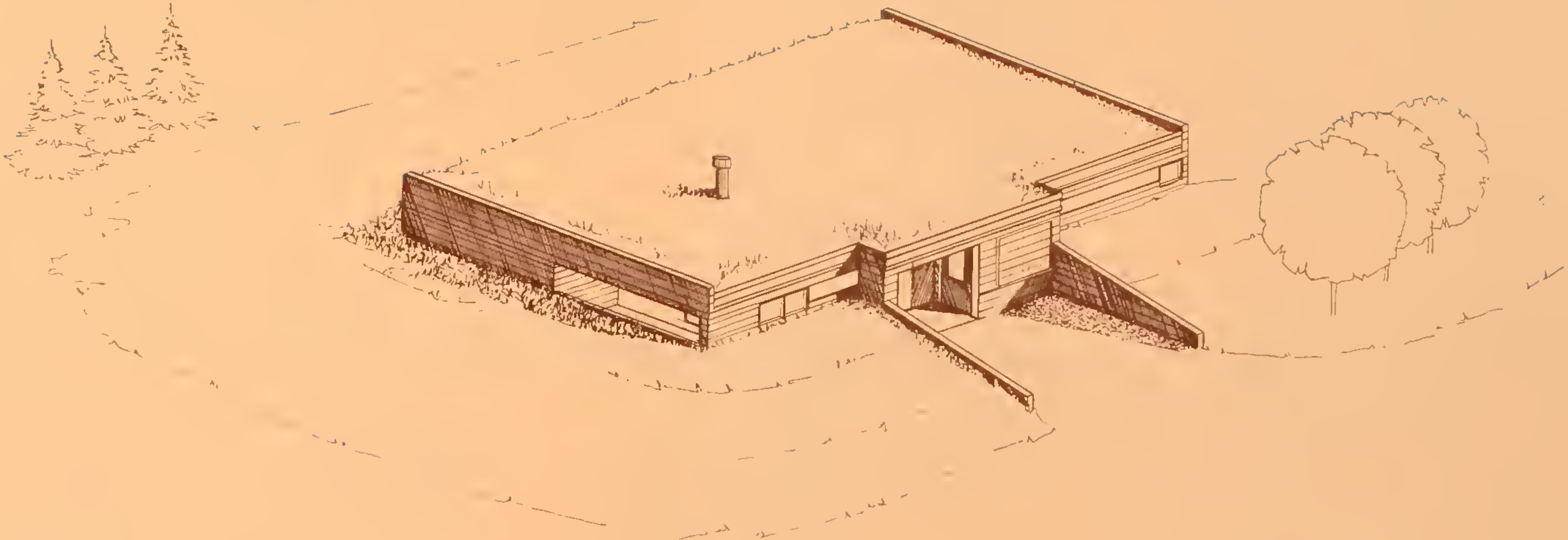
interior
a-a

The above drawing shows an interior elevation looking into the kitchen and dining areas.

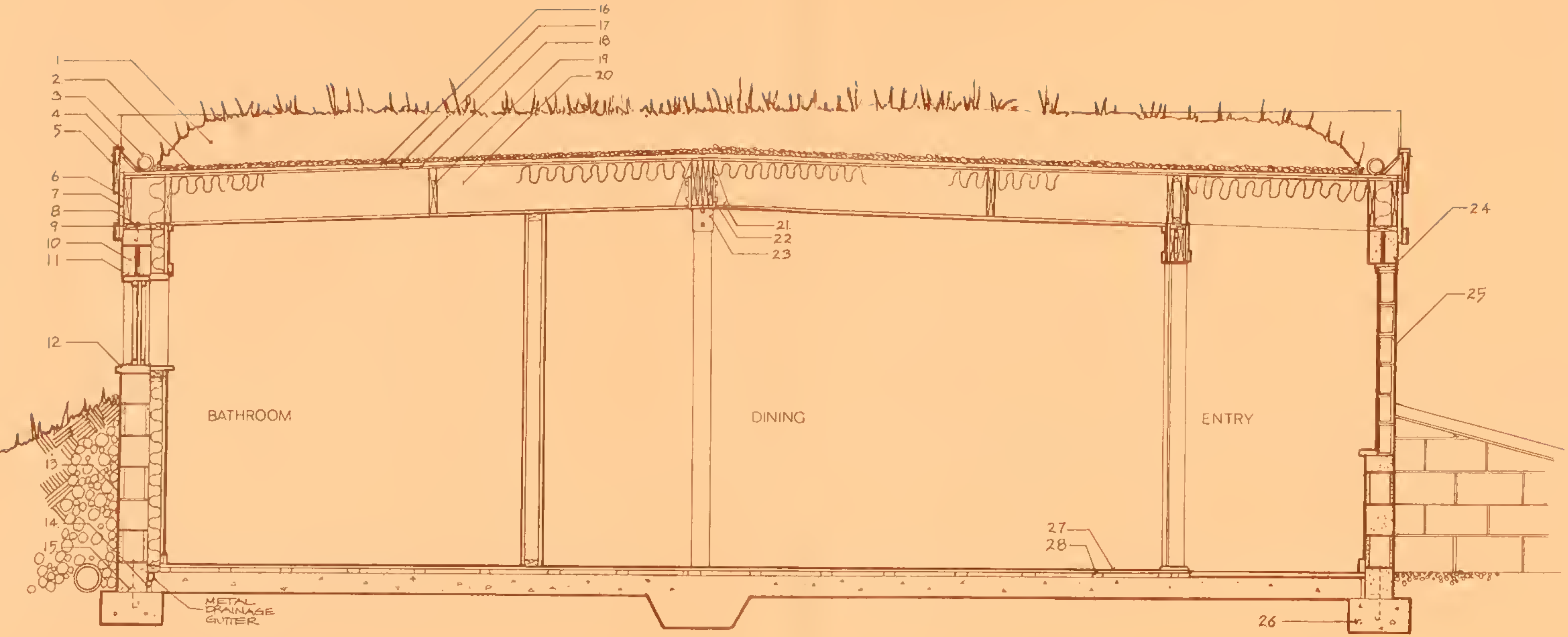
Because one of the major costs in a house is the finish work, we have proposed a very straightforward solution to finishing the low-cost house.

Furnishing this house does not require the same type of furnishings as a traditional house. Because of the different light conditions produced by the block and windows, the light itself becomes a unique decorative feature. Therefore interiors can be finished with very basic furniture and plants. (The shelf below the windows provides an excellent place for plants.) Some types of furniture such as folding wood chairs, cushion couches, plain wood tables, and other furniture might work well in finishing this house.

The appliances and fixtures in the house are often some of the most expensive items to buy. It is suggested that the builder explore the possibility of reusing recycled sinks, bathtubs, stoves, and light fixtures to reduce the interior costs.



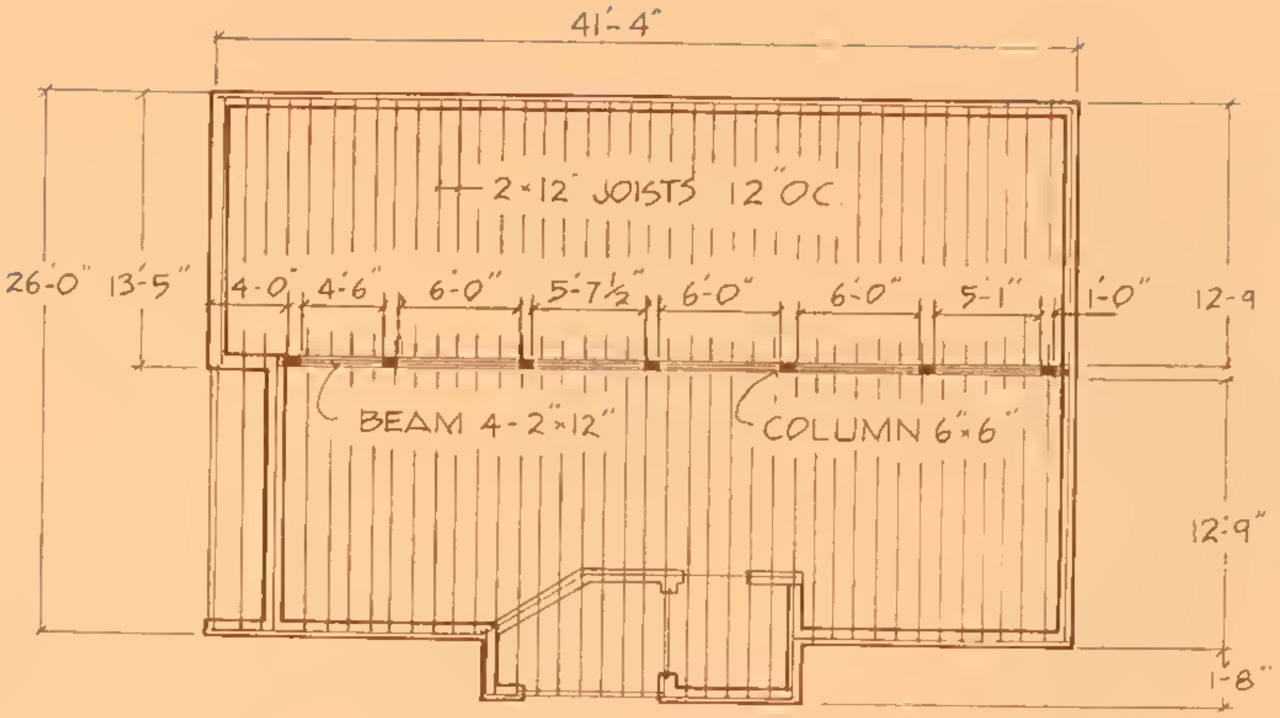
isometric



section d-d

Additional details on page 24.

1. 10" Sod Roof
2. 1" Gravel
3. Drain Pipe
4. Flashing
5. 2"x12" Fascia
6. 2"x12" Header
7. ½" Plywood Fascia
8. Anchor Bolts 4' o.c.
9. 2"x8" Plate
10. 4" Concrete Block
11. Steel Lintel, 2 Angles
12. Concrete Sill
13. Tar Waterproofing
14. Expansion Strip.
15. Anchor Bolt 4' o.c.
16. Three-Ply Builtup Roof
17. 1" Rigid Insulation
18. ½" Plywood Deck
19. 2"x12" Blocking
20. Joists 2"x12", 12" o.c.
21. Joist Hanger (see spec.)
22. Center Beam 4-2"x12", Bolted
23. Column Beam Anchor
24. Steel Angle, Lintel
25. 4"x8"x8" Glass Block
26. Steel Reinforcement
27. ½" Plywood Subfloor
28. 1"x2" Sleepers 16" o.c.



framing plan

A good quality of construction will pay off in the long run both in maintenance and resale value.

1. Fill all hollow block with pour type insulation (vermiculite or perculite). Stud wall should be filled with 3 1/2" of standard fiberglass insulation. Sod roof: use 1" of rigid insulation. If sod is not used use 6" of standard insulation.

2. Sod Roof: ½" exterior plywood deck, 1" rigid insulation, 3 ply built-up roof, visquine, 1" of gravel, 10" of sod and soil.

3. Slab: gravel, visquine, 6" slab. Use perimeter insulation if walls are not bermed. Expansion strip needed between slab and wall.

4. Footings sit on undisturbed soil.

5. Waterproofing: tar underground block and silicone seal above grade block. Use standard flashing and caulking for details above grade.

6. Studs 24" o.c. if nonstructural.

7. Use double glazed, triple glazed windows where possible.

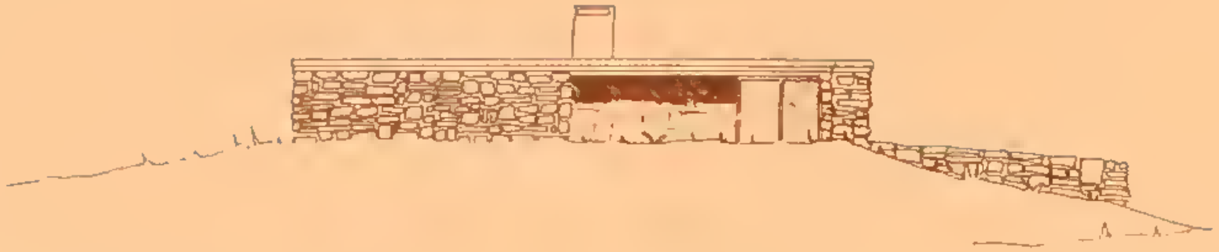
All structure calculated assuming the use of new materials. Do not use salvaged materials for the structure.

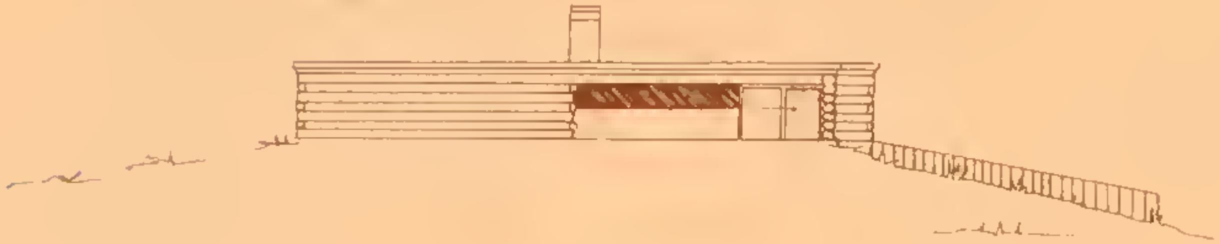
1. Roof structure calculated assuming the use of #2 grade douglas fir or better, with a 40#/ft^2 live load (snow load) and 100#/ft^2 dead load for the sod plus water, and 10#/ft^2 misc. dead load.
   a. Center Beam: 4-2"x12" at 6' max. span.
   b. Joists: 2"x12" at 12" on center.
   c. Center beam columns: 6"x6" spacing shown on framing plan.
   d. Joist hangers: Use Simpson Co. U29N

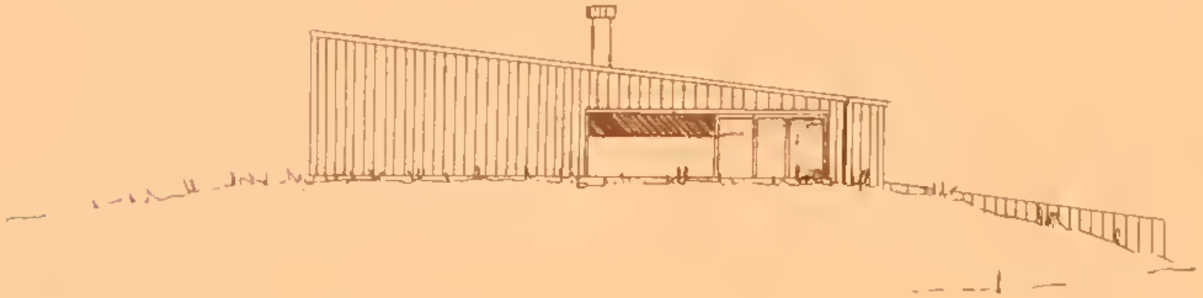
2. Exterior block walls.
   a. Use hollow concrete units type A or N with no inspection. Use type M or S. mortar
   b. Horizontal reinforcement: #3 at 20" or #4 at 36"
   c. Vertical reinforcement: #4 at 18" or #5 at 30"

3. If a sod roof is not used assume 40#/ft^2 live load, and 5#/ft^2 dead load.
   a. Beam: 2-2"x12" max. span 6'
   b. Roof joist: 2"x8" at 16" o.c.
   c. Center beam column: 4"x4"
   d. Joist hangers: Use Simpson Co. U27 N or equal.

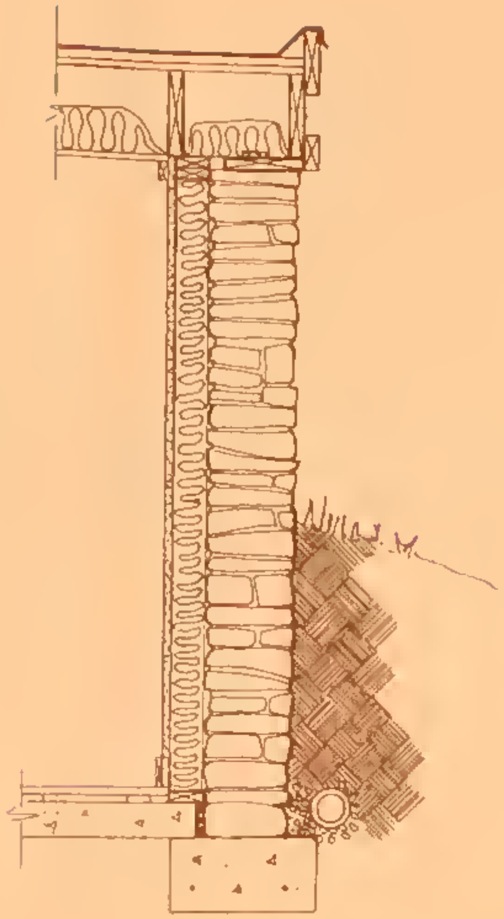
4. Lintels
   a. Over entrance: 2 angles 8"x4"x7/16"
   b. Over windows: 2 angles 5"x3"x3/8" (max span 3')
   c. Over lightwell: 2 angles 8"x4"x7/16"



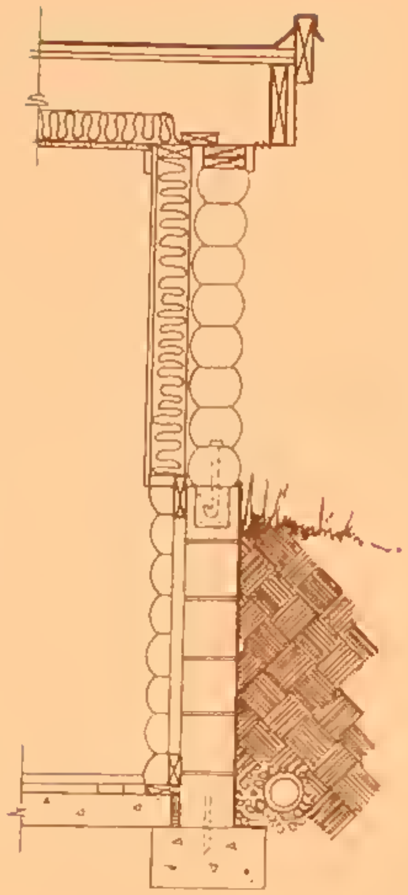




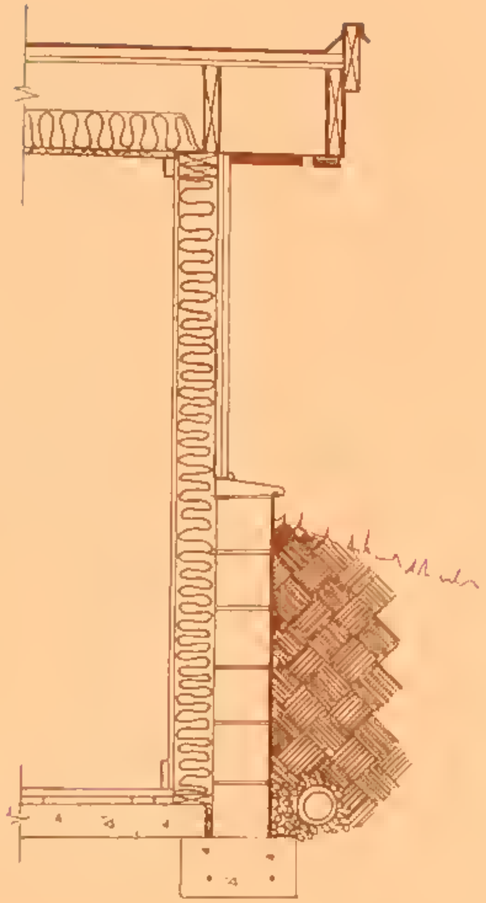
ALTERNATE BUILDING MATERIALS, FLAT SITE



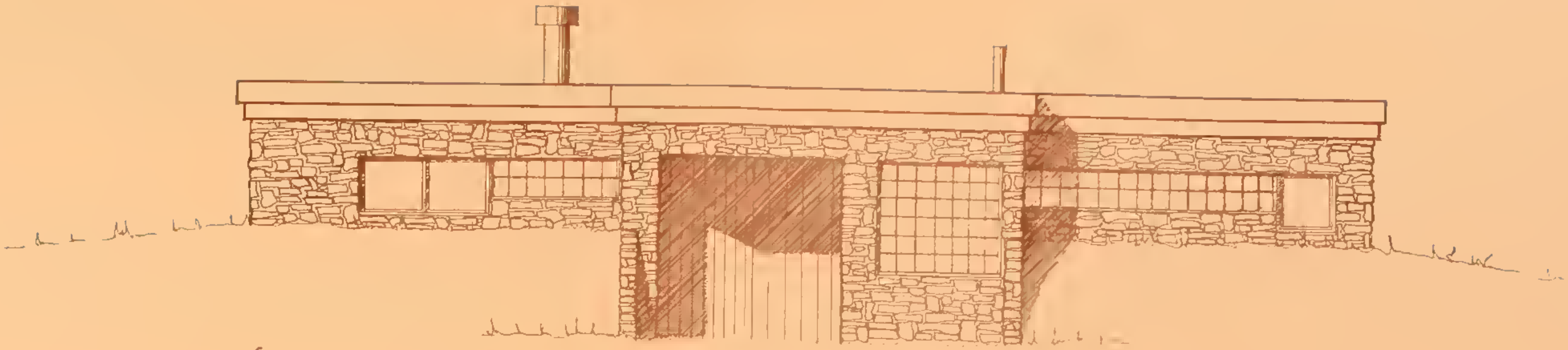
If on site stone is used for the construction material, the wall section becomes 12" to account for the irregularity of the stone. Also the foundation is increased to 18"x10" to provide adequate bearing. More reinforcement may be needed in the foundation. Before berming and backfilling, the below grade stone should be heavily tarred to prevent moisture penetration. Because stone by itself is not a good insulator, the interior will have a standard 2x4 wall with 3½" of fiberglass insulation to increase thermal resistance. Since the stone wall carries the load of the roof, the studs can be placed at 24" o.c. to conserve materials.



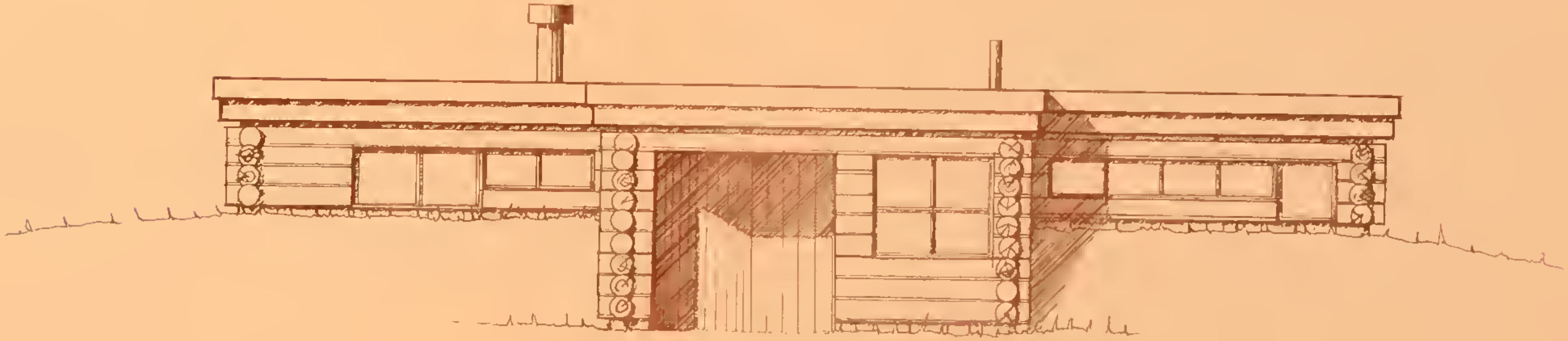
Logs can be used for an alternative material in the flat site house. The above section shows the connection between the precut logs, the roof and the block foundation wall. The interior is furred to provide extra insulation value, logs by themselves are very low in thermal resistance. The finish is of half logs on furred 2x2's with 1½" of rigid insulation. The upper section of the wall is 2x4 construction with 3½" of glass insulation. This section has been structured for a non-sod flat roof and for a sloped roof.



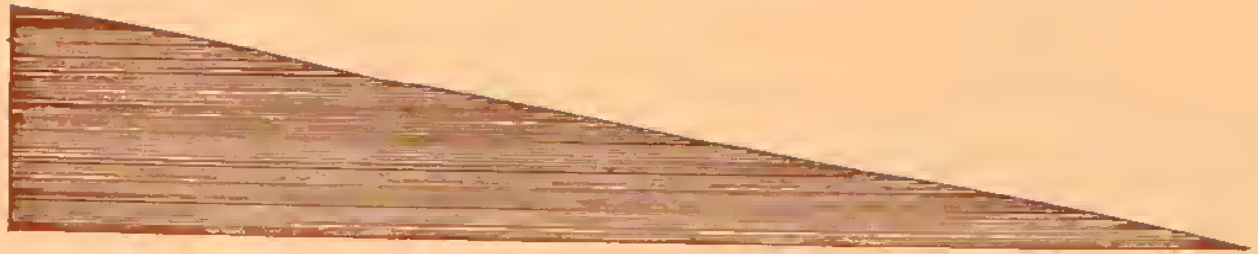
The stud wall section shown is constructed with 2x6's 16" o.c. and sheathed above grade with plywood T1-11. This load bearing wall is constructed on the inside of a block retaining wall. The below grade section of the block wall is heavily tarred to prevent moisture penetration. An overhang will protect the sill cap from moisture. Six inches of insulation should be used in the stud wall to provide adequate thermal resistance.



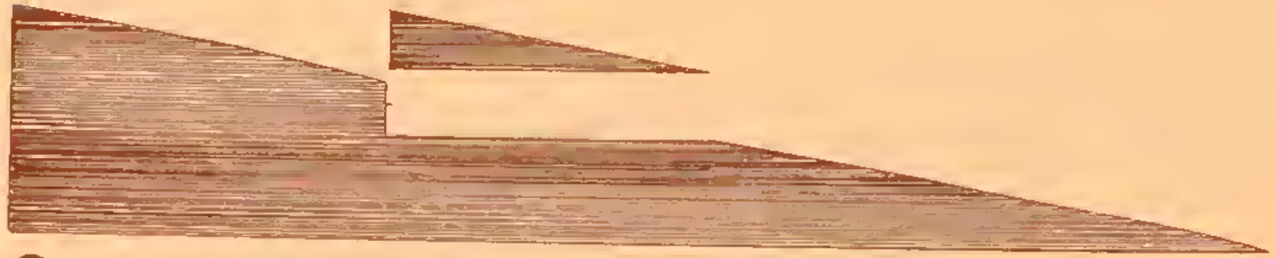
front stone



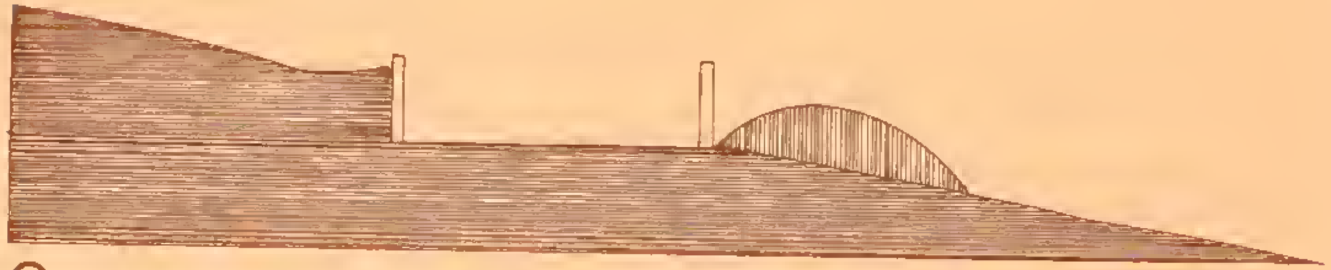
front log



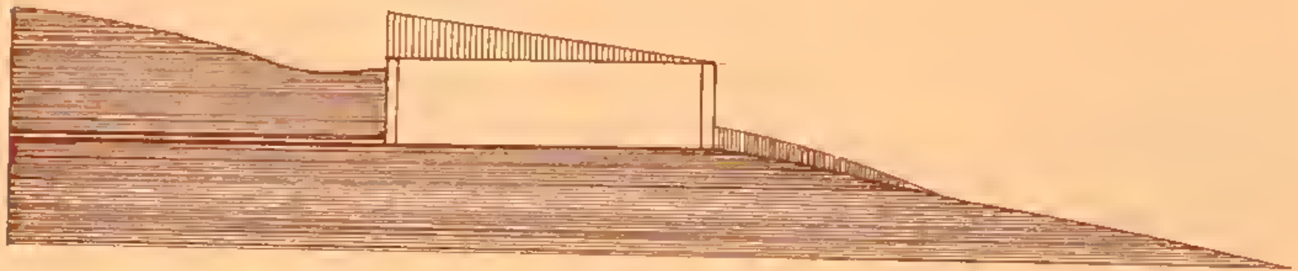
1 EXISTING SLOPE



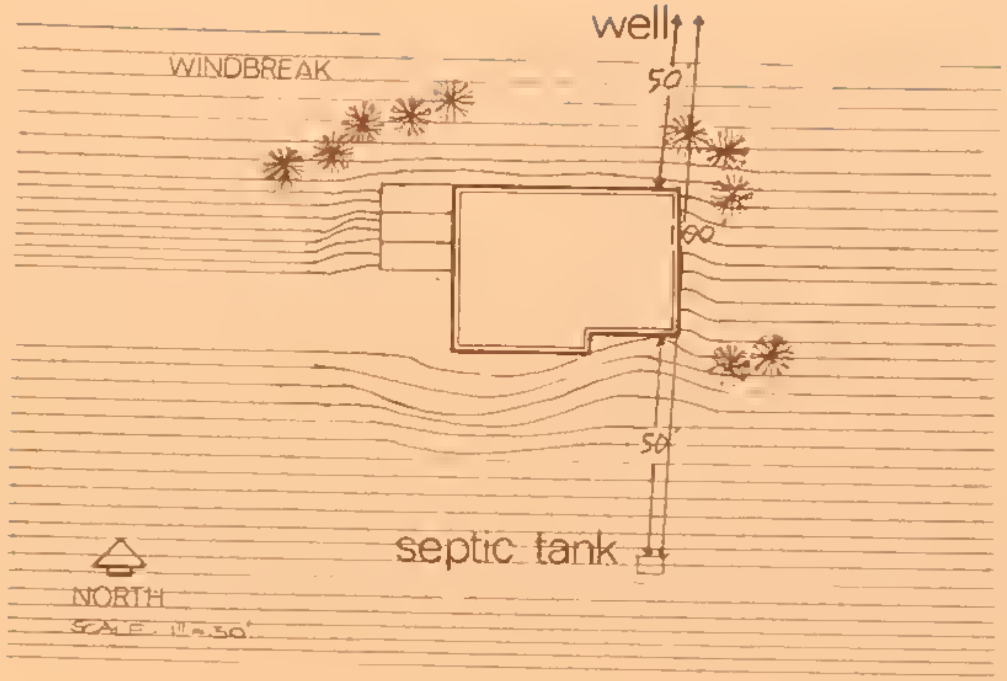
2 EXCAVATE, SAVE SOIL AND PLANTS



3 CONSTRUCTION



4 REPLACE SOIL AND PLANTS

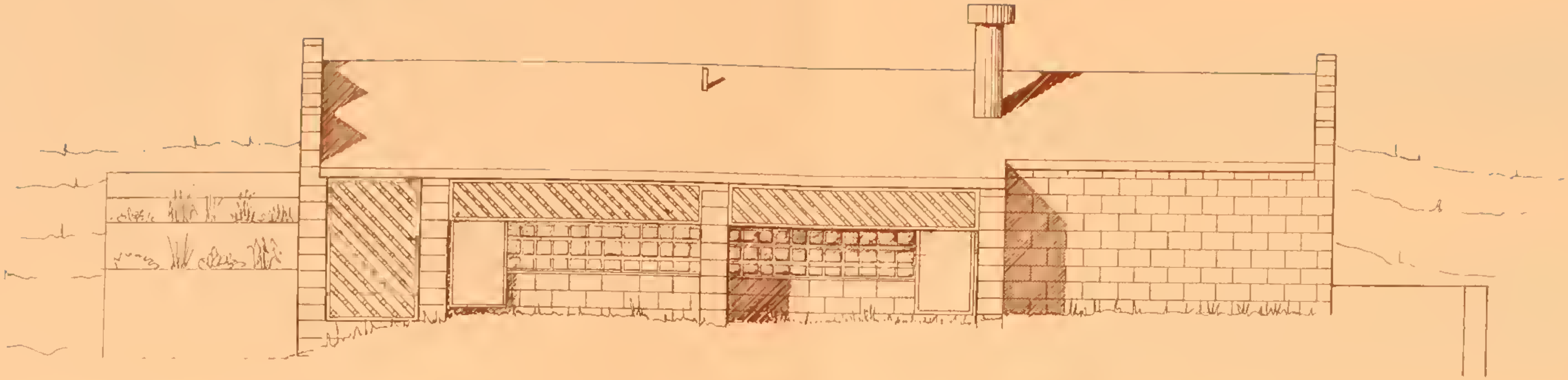


The following building is designed for a 30% sloped site with a southerly orientation. In selecting the site, soil tests for soil bearing, stability, and drainage should be conducted by qualified personnel. This soil test will also give data to the layout of the septic field and the type of drainage needed.

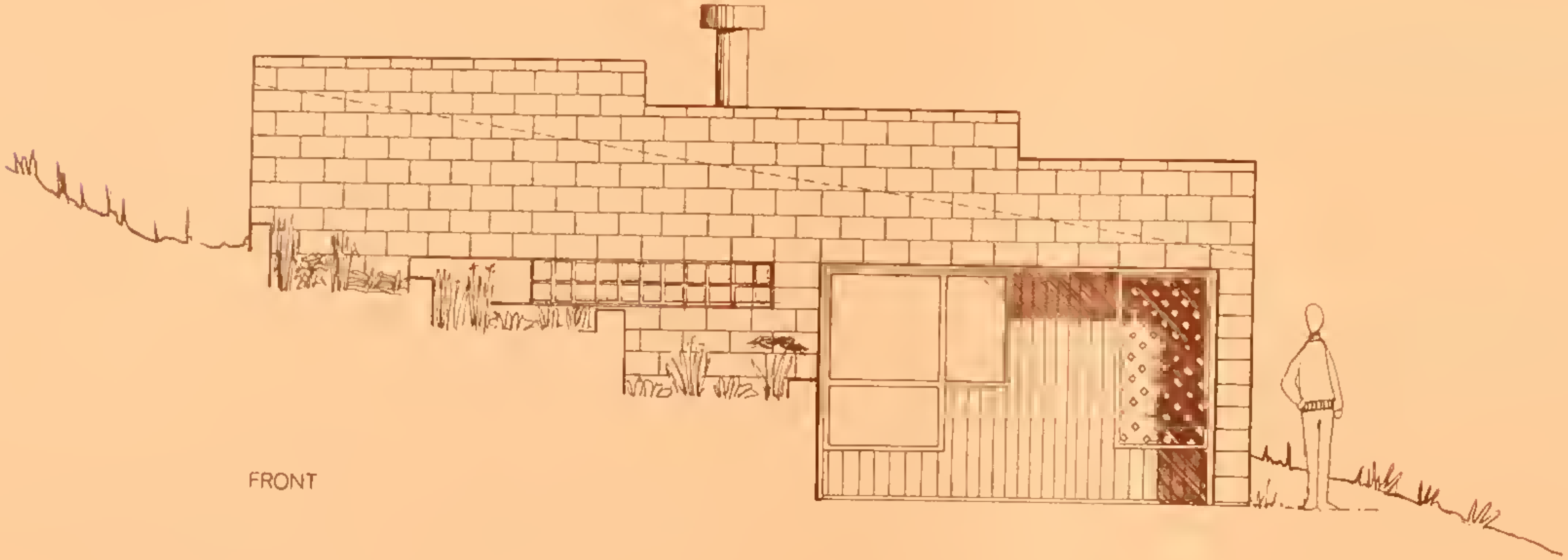
In planning the location of the utilities, the well should be located at a distance equal or greater than 50' up hill from the house and the septic field a distance equal or greater than 50' below the house. This separation of 100' is necessary to prevent the contamination of the water source.

The house is pushed into the side of the hill in order to gain the natural insulation from the soil. In using the soil to berm back up on the lower side of the house, it blends into the site rather than intruding on it.

HOUSE B, sloped site

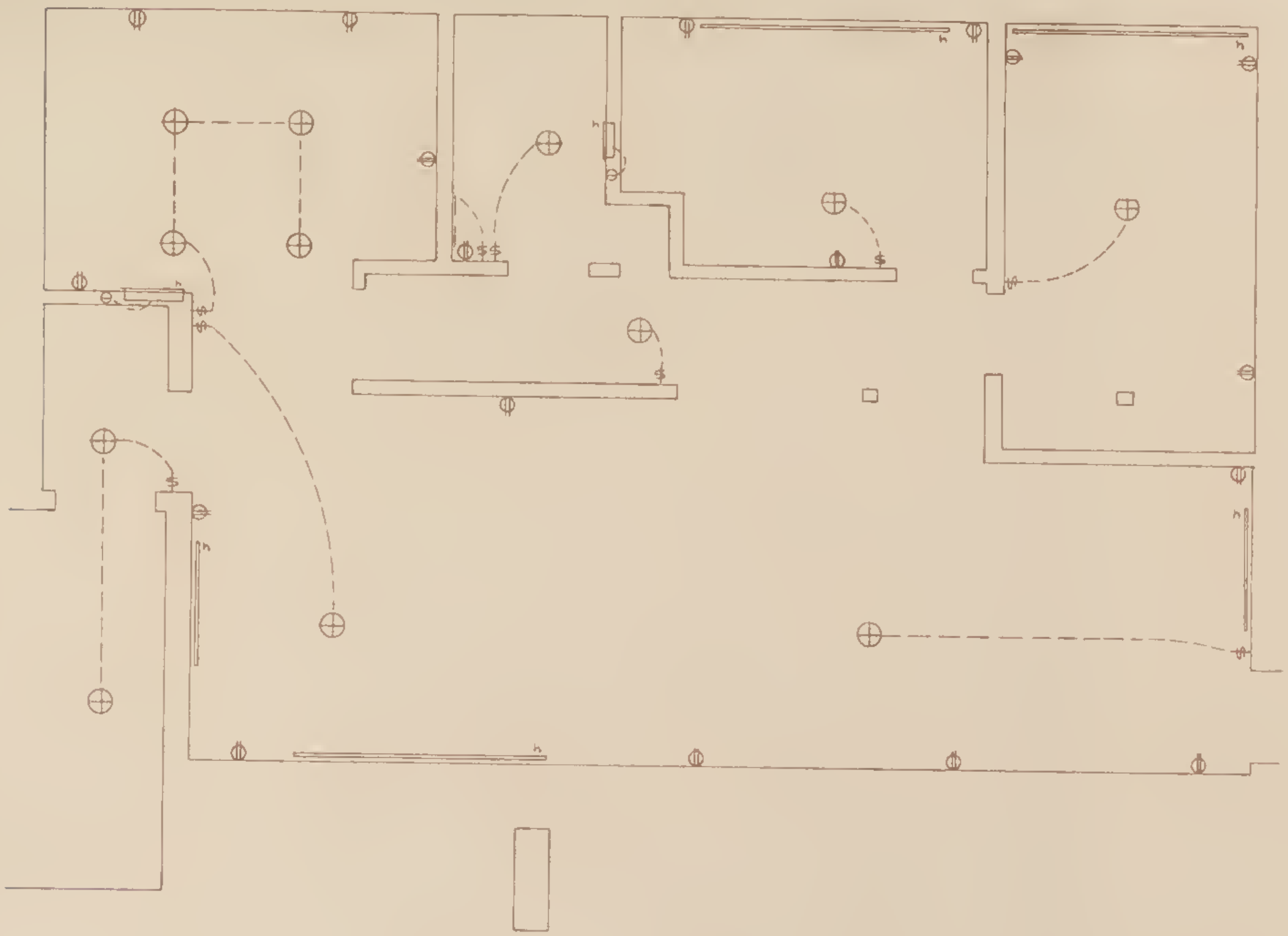


SIDE



FRONT

elevation



electrical and heating

NOTE: FOR MINIMUM PIPE SIZES AND TYPES OF CONNECTIONS, SEE YOUR LOCAL PLUMBING CODE OR THE NATIONAL PLUMBING CODE

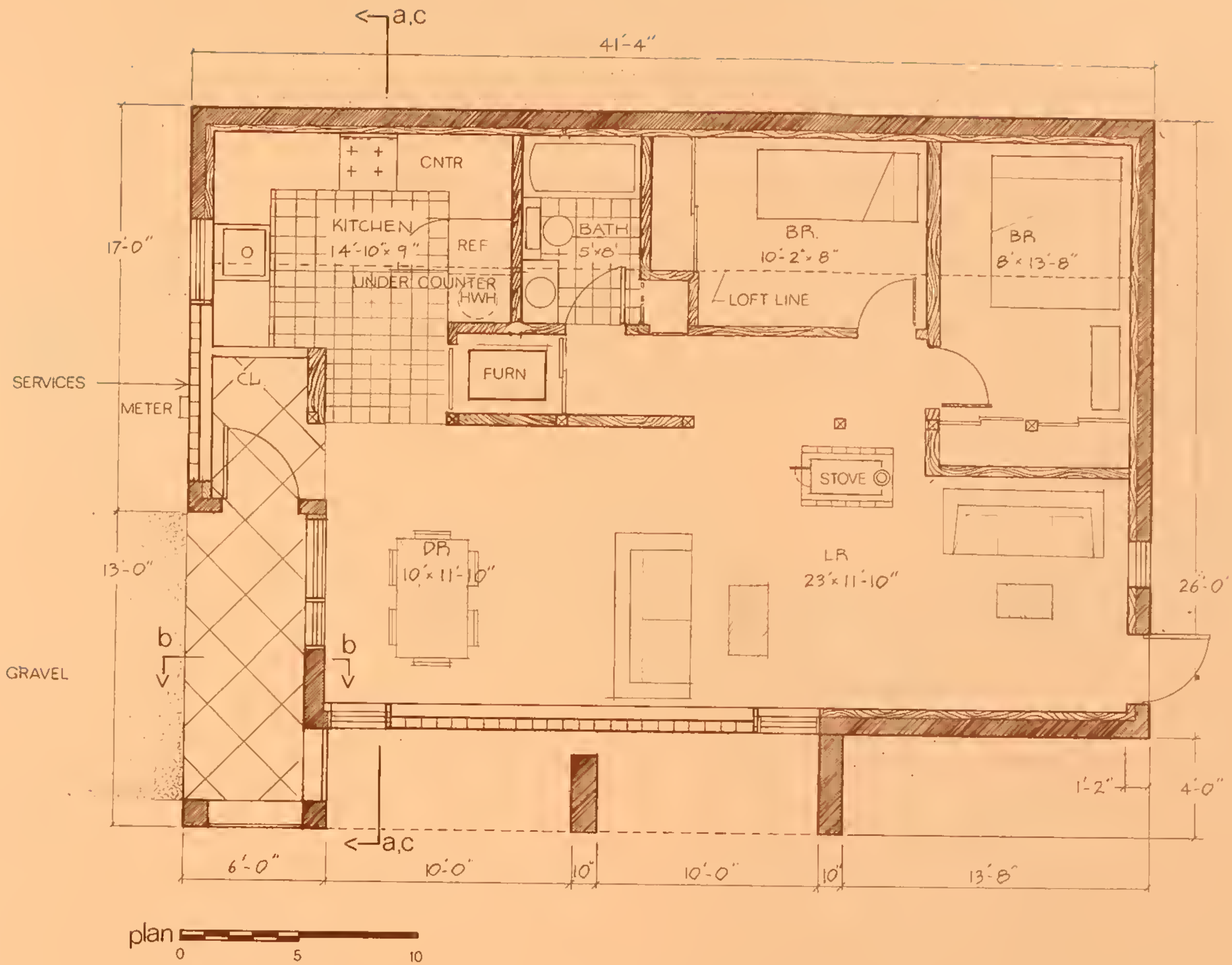
key

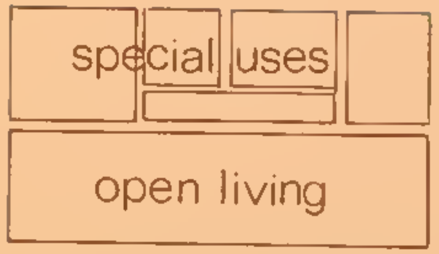
⦶ ⊖ outlet

switch

⊕ light

— heater

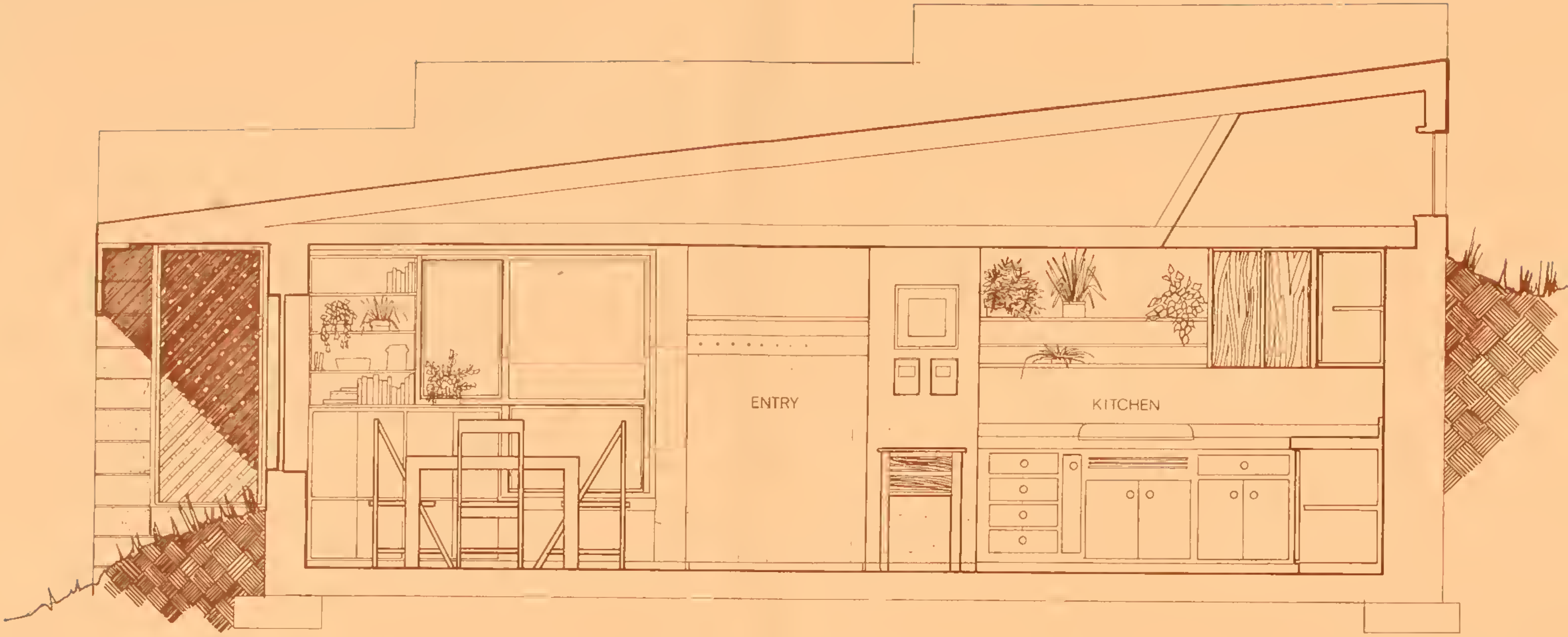




The plan of the hillside house functions in a way similar to that of the flat site house. In the hillside house the entrance is on the end and is protected by an enclosed porch. This enclosure provides protection from winter winds, the lattice screens give protection from the summer sun.

The interior plan changes place the kitchen near the entrance with the living area in the same relation as the flat site. Because the house has a sloped roof, a storage area is built-in above the kitchen and bedrooms. This attic is accessible from the light well and is insulated.

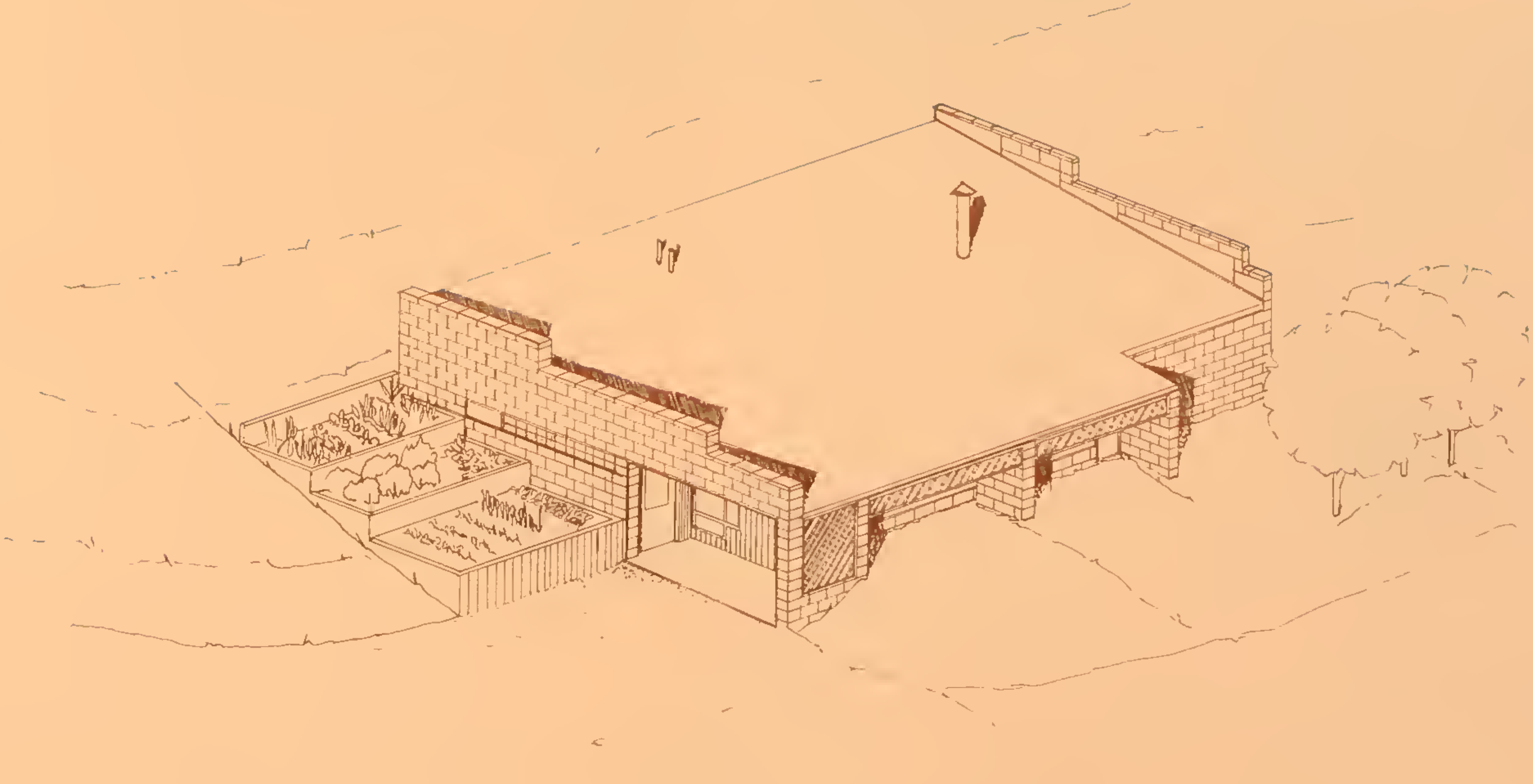
With the house built into the hillside, the area adjacent to the entrance becomes a terraced spot for a vegetable garden and flower bed. This area can be the only formal landscaping, leaving the option of natural landscaping for the remainder of the site.



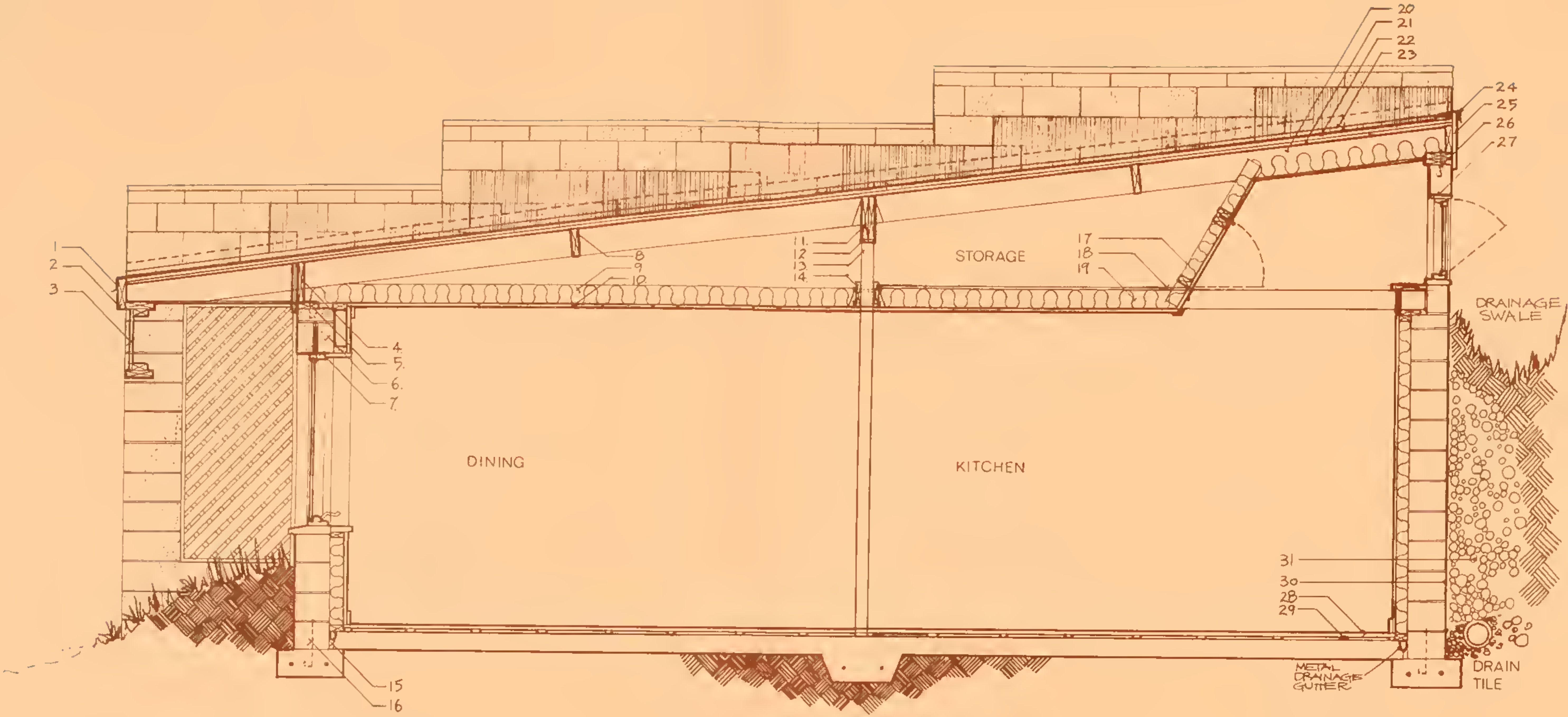
interior
a-a

The above drawing shows an interior elevation looking towards the entrance thru the dining and kitchen area.

As mentioned on page 12, it is suggested that the interiors be finished in a simple way resulting in both a low-cost and pleasant interior.

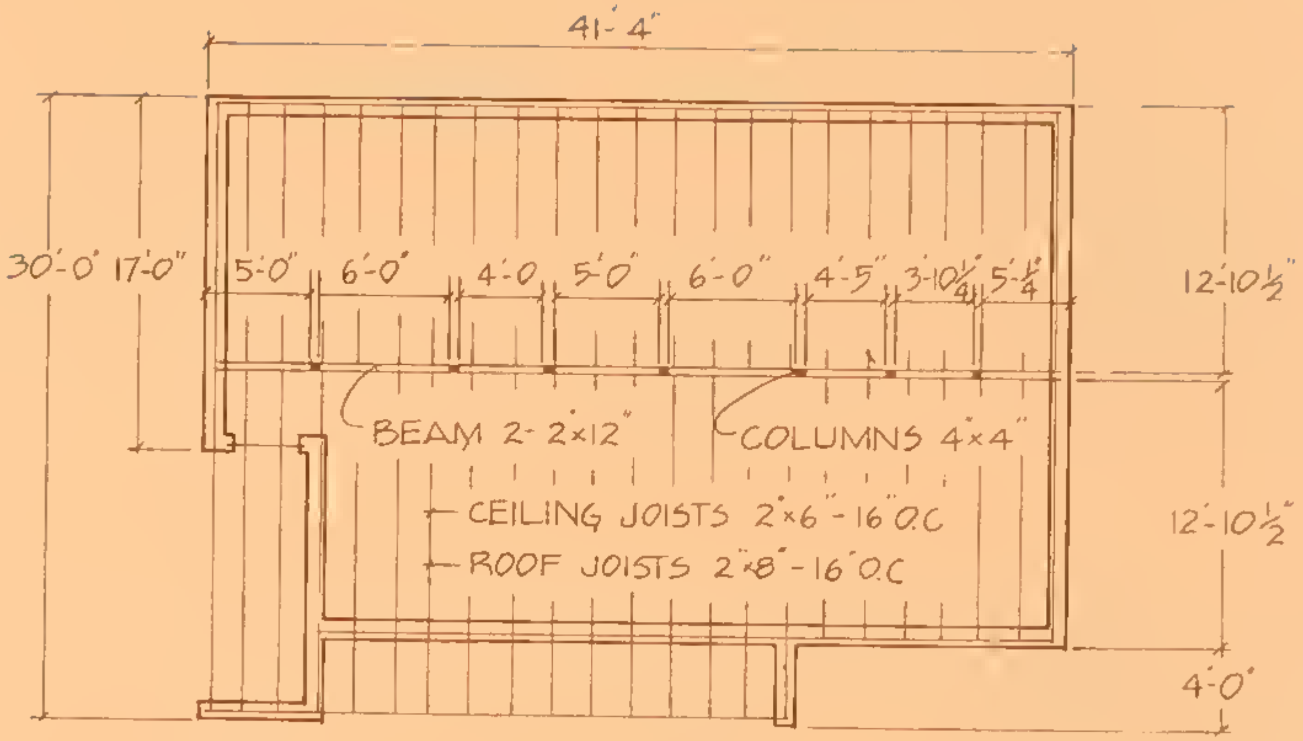


isometric



section C-C

1. Flashing
2. 2"x8" Fascia
3. Lattice Sunscreen (½"x2")
4. 2"x12" Header
5. 2"x6" Plate
6. 4" Block
7. Steel Angle Lintel (see spec.)
8. 2"x8" Blocking
9. 2"x6" Ceiling Joist
10. ½" Sheetrock
11. Center Beam 2-2"x12"
12. Bearing Plate
13. 4"x4" Columns (spacing on framing plan)
14. 2-2"x8" Beams Bolted
15. Expansion Strip
16. Anchor Bolt at 4' o.c.
17. Storage Access Door
18. ½" Plywood Attic Floor
19. 6" Fiberglass Insulation
20. 2"x8" Roof Joist
21. ½" Plywood Deck
22. Roll Down Asphalt Roofing
23. Parapet Flashing
24. Flashing
25. 5/8" Plywood Fascia
26. Anchor Bolt
27. Steel Angles for Lintels
28. ½" Plywood Subfloor
29. 1"x2" Sleepers 16" o.c.
30. Waterproofing
31. Gravel



framing plan

A good quality of construction will pay off in the long run both in maintenance and in resale value.

1. Fill all hollow block with pour type insulation (nodules or pellets). Stud wall should be filled with 3 ½" of standard glass insulation or at least with its equivalent. The ceiling should be insulated with 6" of standard insulation or its equivalent.

2. Roof: 1/2" plywood deck, tar paper, rolled on mineral asphalt roofing.

3. Slab: gravel, visquine, 6" slab. Use perimeter insulation if walls are not to be bermed. Expansion strip is needed between slab and wall. Footings sit on undisturbed soil.

4. Use double glazed windows, triple glazed where possible.

5. Studs 24" o.c. if nonstructural

6. Waterproofing: tar underground block and silicone seal above grade block. Use standard flashing and caulking for details above grade.

All structure calculated assuming the use of new materials. Do not use salvaged materials for the structure.

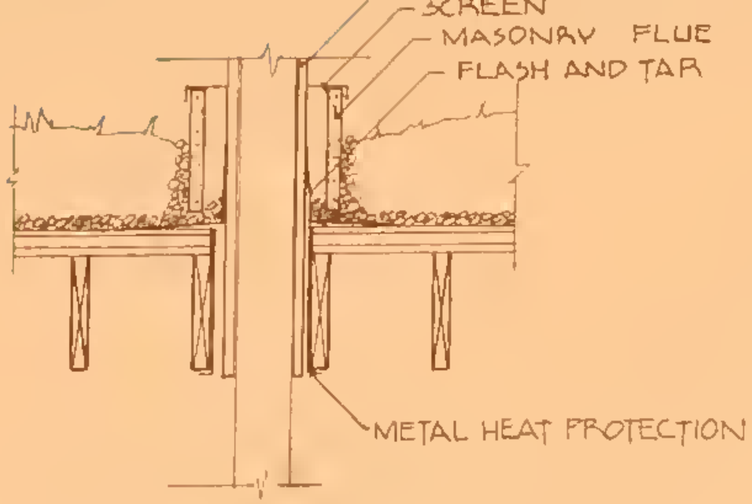
1. Roof structure assuming the use of #2 grade lumber or better, with a 40#/ft^2 live load (snow), and a 5#/ft^2 dead load.
   a. Center beam: 2-2"x12" max. span of 6'
   b. Roof joists: 2"x8" 16" o.c.
   c. Center beam column: 4"x4" (see framing plan for spacing)

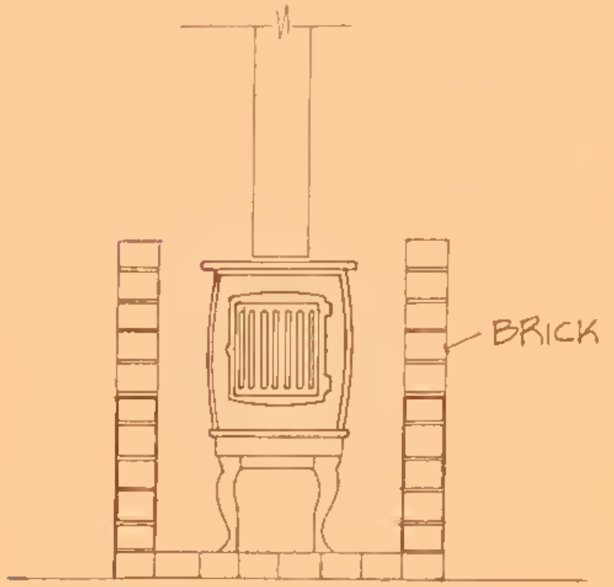
2. Ceiling joists calculated assuming 20#/ft^2 live load (storage in attic) and 8#/ft^2 dead load.
   a. Center beam: 2"x8" max. span 6'
   b. Joist hangers: Simpson Co. U25N or equal.

3. Exterior walls
   a. Use hollow concrete units type A or N with no inspection. Use type M. or S. mortar
   b. Horizontal reinforcement: #4 at 24" or #5 at 40"
   c. Vertical reinforcement: #5 at 16" or #6 at 24"

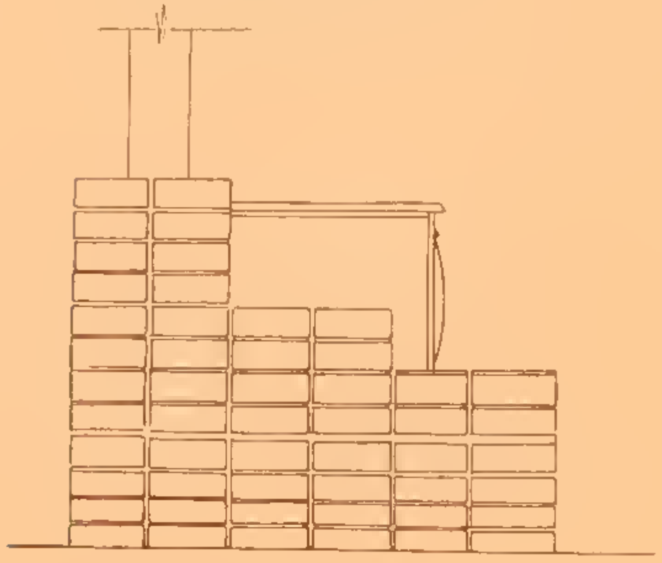
4. Lintels
   a. Over entrance: 2 angles 8"x4"x7/16"
   b. Over windows: 2 angles 5"x3 1/2"x 3/8"

5. The walls are calculated assuming backfill soil to be standard granular fill with $\varnothing = 33^{\circ}40'$



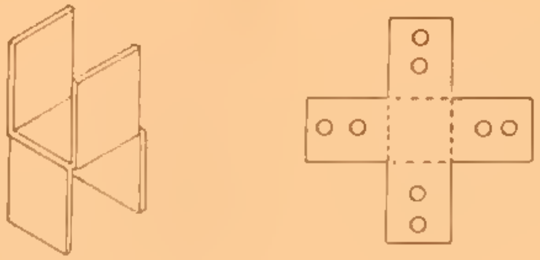


FRONT VIEW

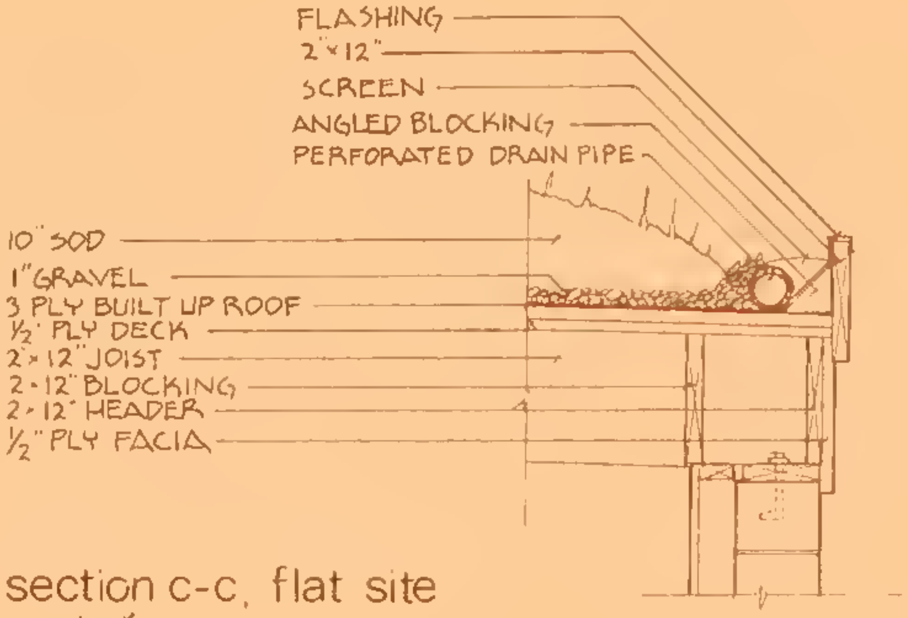


SIDE VIEW

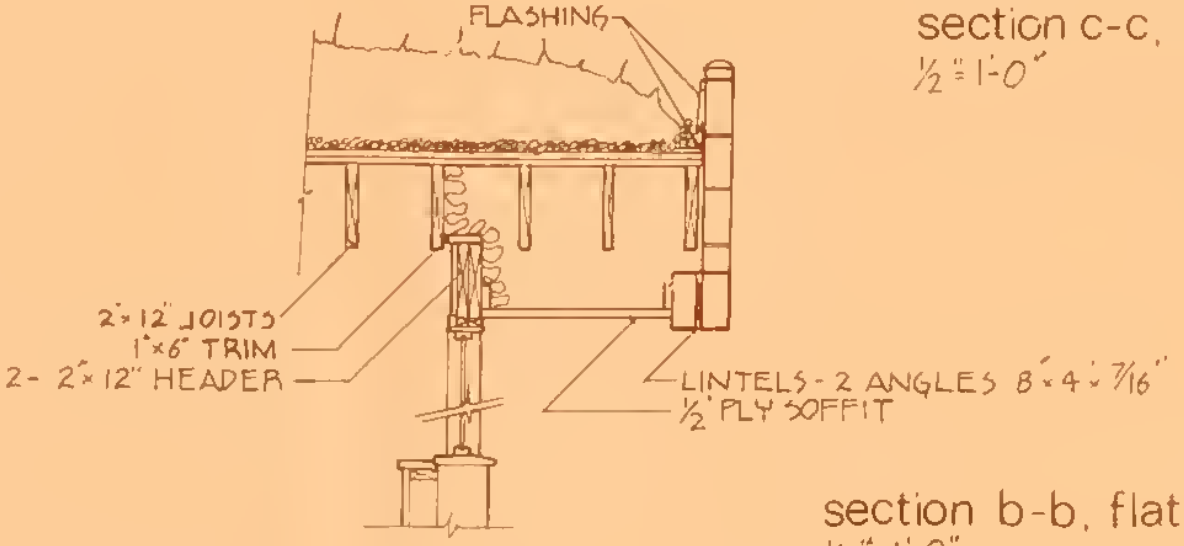
yellowstone type heating stove
¾"=1'-0"



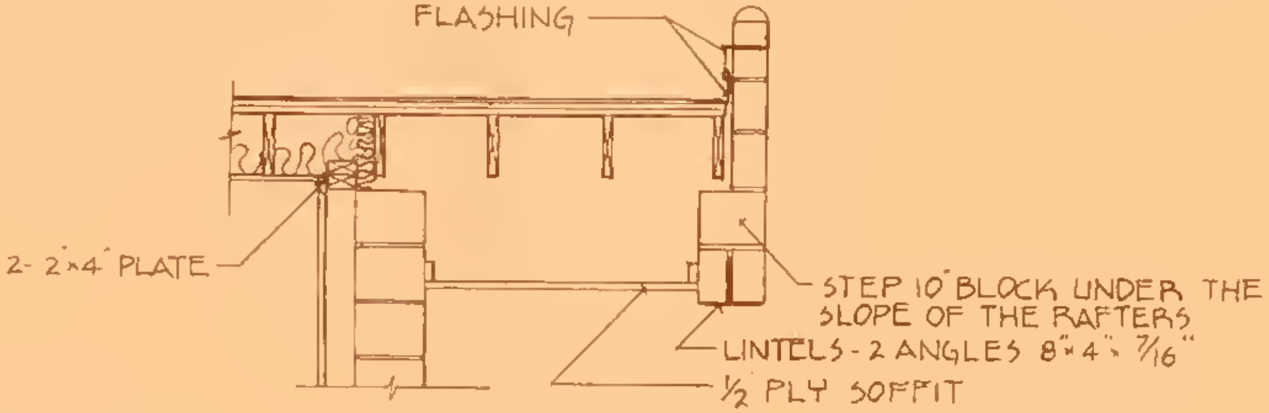
beam - column connector



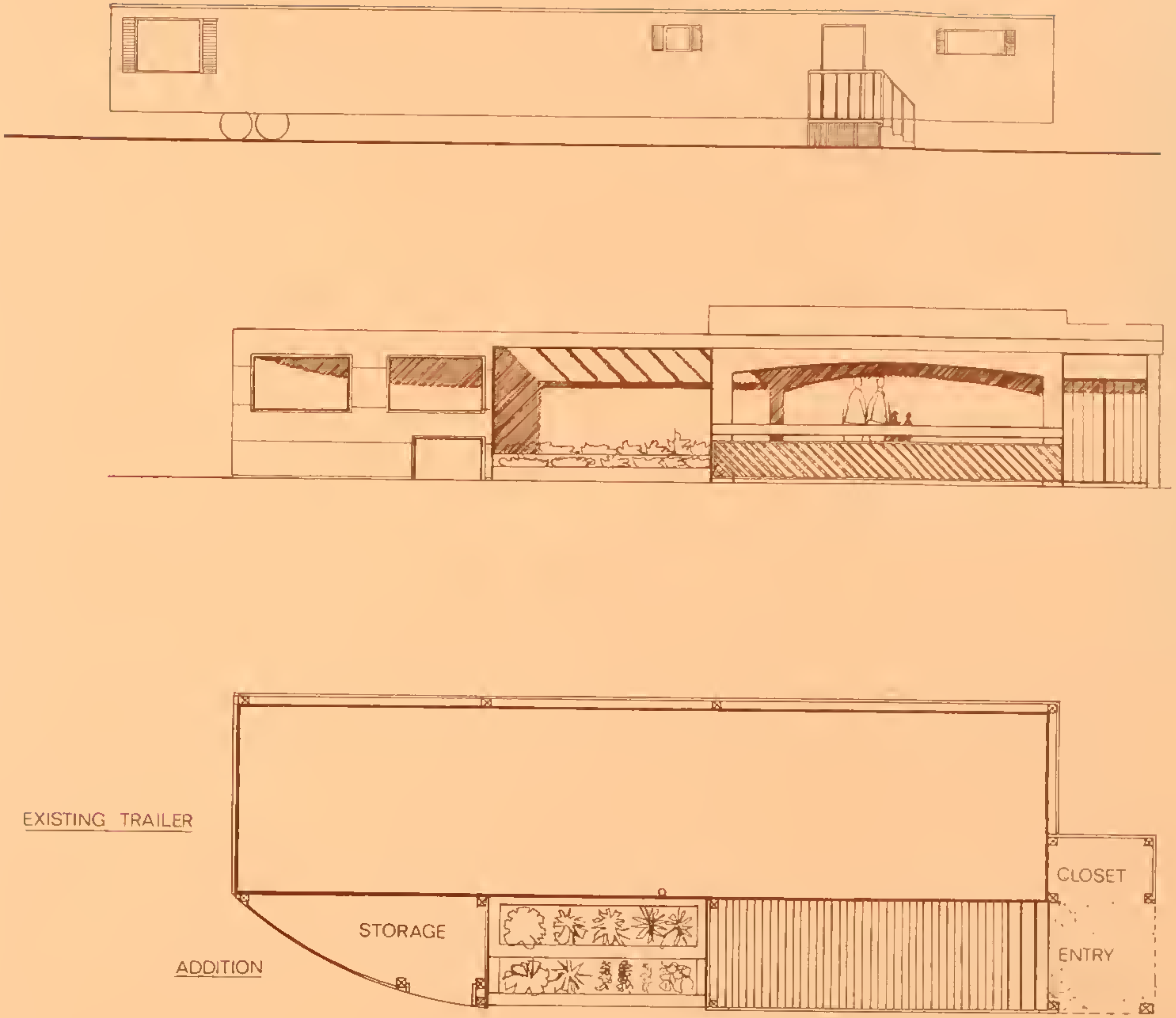
section c-c, flat site
½"=1'-0"



section b-b, flat site
½"=1'-0"


FLASHING
2- 2"×4" PLATE
STEP 10" BLOCK UNDER THE SLOPE OF THE RAFTERS
LINTELS - 2 ANGLES 8"×4"×7/16"
½ PLY SOFFIT

section b-b, sloped site
½"=1'-0"



elevation and plan

If one owns a mobile home, fairly simple modifications can be made to lessen summer heat gain and winter heat loss. Also the harsh transition between exterior and interior, often typical of a mobile home, can be softened.

The design shown has a second roof which will provide sun protection in the summer and will create an airspace for additional winter insulation. The roof would solve the problem of structural failure due to snow loads on inadequately designed roofs.

The purpose of the new facade is to create a transition between the outside and inside, adding a porch area and a garden or storage area. Another choice would be the addition of a room or extension providing more space. The new facade will cut down on induced air infiltration as a result of winter winds and provide sun protection in the summer.

The materials used would be of a lightweight nature such as masonite, plywood, or sheet metal. In addition to the skin materials the use of lattice will provide sun protection without reducing the visibility.

TRAILER ADDITION

RESOURCES

bibliography
package homes

DO-IT-YOURSELF PUBLICATIONS

on this page may be obtained from MOTHER'S BOOKSHELF
P.O. Box 70, Hendersonville, N.C. 28739

Practical Farm Buildings: A Text and Handbook by James S. Boyd, Ph.D. A thorough study of low-cost, one-story, clear-span construction based on sound engineering principles. 265 pages. Paperback. $7.95

Do-It-Yourself Housebuilding: Step-by-Step by Charles D. Neal. Tells non-carpenters how to build a one-story house, garage or weekend retreat. Includes a thorough explanation of each construction step and hundreds of tips used by professional builders. 246 pages. Hard cover. $12.00

The Forgotten Art of Building a Good Fireplace by Vrest Orton. Some "basic and immutable" principles of fireplace design. 60 pages. Paperback $2.50

Making the Adobe Brick by Eugene H. Boudreau. For folks with more time and ambition than experience or money, the complete manual for designing and building an adobe house. 98 pages Paperback. $2.95

Illustrated Housebuilding by Graham Blackburn. Comprehensive, non-technical instruction in the basic method of erecting a standard frame house, with separate chapters on each major architectural feature and over 400 very detailed illustrations. 155 pages. Hard cover. $10.00

How to Build Your Home in the Woods by Bradford Angier. A pretty fair guide to building the traditional north woods log cabin and other structures. 310 pages. Paperback $2.95, Hard cover $7.50.

How To Use Tools by Alfred P. Morgan. If you can't distinguish a ripsaw from a crosscut-or a chisel from a gauge--this book is for you. 143 pages. Hard cover. $3.50

The Wilderness Cabin by Calvin Rutstrum. A general guide to log and frame cabins, locations, water supply, sewage disposal, fireplaces, auxiliary structures, food caches and living in a cabin. 194 pages. Paperback. $1.95

The Owner-Built Home by Ken Kern. One of the most detailed, helpful books on constructing a low-cost, contemporary home. 281 pages. Paperback. $7.50

Adobe-Build it Yourself by Paul Graham McHenry, Jr. Mud brick housing instructions from the financing stage to interior decoration. 157 pages. Paperback. $7.95

Designer Furniture Anyone Can Make by William E. Schremp. Streamlined, durable household furnishings can be made simply by using cubes of heavy plywood covered with plastic laminate. 128 pages. Paperback. $2.95

How To Build and Furnish a Log Cabin by W. Ben Hunt. Backwoods building with hand tools only, as taught by a lifelong outdoorsman. 166 pages. Paperback. $3.95

How to be Your Own Home Electrician by George Daniels. All you need to know to do your own wiring. 144 pages. Paperback. $1.95

Wiring Simplified by H.P. Richter. Not as many illustrations as "How to be Your Own Home Electrician", but it gives you the same information and costs less. 143 pages. Paperback. $1.39

Anderson, L. O.
Wood Frame House Construction, Craftsman Book Co. of America, L. A., Calif. 1971, $2.75

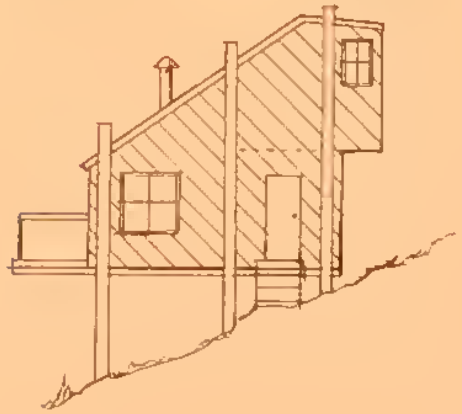
A thorough book covering conventional frame construction details including information on insulation, foundations, simple trusses, walks, and drives.

Anderson, L. O., & H. F. Zoring
Build Your Own Low Cost Home, Oover Publications, N. Y. 1973, $4.95

A very complete book including complete working drawings, specifications on 11 houses, and a valuable section called Construction Manual. The designs are questionable to use in Montana but the construction information is applicable to most basic building types.

Dietz, Albert G. H.
Owelling House Construction, M.I.T. Press, Cambridge, Mass 1971

A detailed book covering frame construction with a section on the selection of a site and the planning of the sanitary systems.

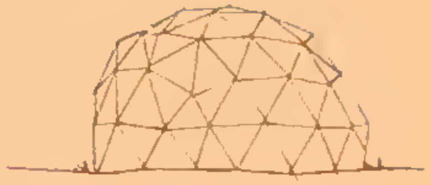


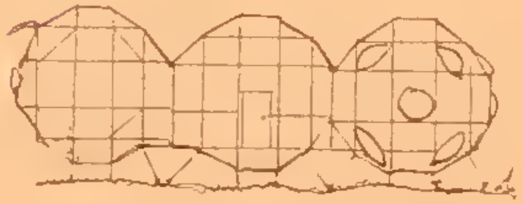
Isaacs, Ken
How to Build Your Own Living Structures, Harmony Books, N. Y. 1974 $4.95

An informative book that explores some alternatives to the conventional construction including built-in interior living arrangements that eliminate the need for traditional furniture. Also included in the book is demountable modular housing that can be constructed on short-term notice. Included are informative ways to salvage materials, buy lumber, hardware and just plain common sense.

Merril, Ooug & Loveday, Evelyn
Low Cost Pole Building Construction, Garden Way Pub. Co., Charoltte, Vt. 1975, $4.95

Pole construction costs, due to the elimination of foundations, are kept much lower than in traditional building construction. This low-cost building construction is explained in this book with details of pole selection, fasteners, basic layout, and construction. Also illustrated are some basic pole building designs.





Shelter Publications
Oomebook 2, third edition, available from Mountain books, P.O. Box 4811; Santa Barbara, Calif. 93103 , $5.00 + 60¢ handling.

A complete book of geodesic dome information in the Whole Earth Catalogue format. A 1974 edition includes the experience gained in building domes since 1968 including a general negative attitude toward domes as a housing solution, and a new direction is explained in their latest publication called Shelter .

Shelter Publications
Shelter, available from Mountain Books, P.O. Box 4811, Santa Barbara, Calif. 93103, $6.00 + 60¢ handling.

The Oomebook author's latest thoughts on housing, includes an extensive review of the indigenous architecture from around the world with enough information included to build from. Also the latest on domes and zomes in a chapter called "Oomebook 3'.

Sheppard, Treadgill, & Holmes
Paper Houses, Schocken Books, N.Y. 1975, $6.95

Plastic impregnated laminated papers are a viable building material. This book shows how to calculate and build domes and zomes out of these lightweight economical materials.

Stedman, Myrtle & Wilfred
Adobe Architecture, The Sundown Press, New Mexico 1973

Written for the warm dry southwest, a cheap and easy to build construction plan but needs modification for Montana climate.

PACKAGE HOMES

There are three categories of do-it-yourself house kits: pre-cut, prefab, and cedar or pre-cut log. In all cases, care should be taken in selection as different stages of completion and quality of materials are given by manufacturers. The following are brief descriptions of each product and the addresses of companies that can be contacted in regard to their products.

CEDAR and PRE-CUT LOG

Cedar and pre-cut log homes are usually constructed of tongue and groove solid wood in both the interior and exterior walls. Because wood by itself is not a good insulator the buyer should explore the possibility of buying the house as a shell and by adding furring and insulation on the interior improve the energy efficiency of the house. The window glazing, plumbing and foundation should be added to the final cost when buying a cedar or log home.

Mountain Meadow Homes
1521 1/2 Lewis Ave
Billings, Montana 59102

Lumber Enterprises Inc.
Canyon Route
Gallatin Gateway, Montana

Lindal Cedar Homes
923 S. Main
Kalispell, Montana

Lincoln Log Cabins
Box 304
Lincoln, Montana

Banner Construction
1236 Helena Ave
Helena, Montana

National Log Construction Co. Manuf.
Air-Lock Logs, Custom Pre-cut
East of Thompson Falls
Thompson Falls, Montana

PREFAB

Prefab construction is a package where all of the wall sections come in panels with insulation and siding in place. Some packages may also include the interior finish materials and light fixtures. The buyer should check into the price of the package to determine whether foundations, plumbing, and the electrical work are either partially included or not. The amount of insulation in the roof and walls, the glazing of the windows and the insulation in the floor may not be designed for Montana standards and climate. If this is the case, the buyer should inquire about the additional cost of including more insulation and double or triple glazing of the windows.

Tomlinson Construction Co.
818 Burlington Ave
Missoula, Montana

Wright Lumber Co.
West of Missoula
Missoula, Montana

Structural Panel Components
East of Stevensville
Stevensville, Montana

Donald E. Mickleson
Select Factory Built Homes
821 Missouri Ave
Deer Lodge, Montana

Modern Way Homes
Division of Lumber Yard Supply Co.
13 N. & River Dr.
Great Falls, Montana

Mountain Sales Inc. (Boise-Cascade)
Highway 10 W.
Missoula, Montana

M&M Supply
Mid-Western Homes
East of Baker
Baker, Montana

PRE-CUT

Pre-cut construction usually includes all of the lumber, plans, and finish materials needed to construct a house. When checking into different pre-cut houses; the amount of insulation, the glazing and type of windows, the plumbing cost, and the foundation need to be checked to see if they are adequate for Montana climates. In many situations, extra insulation is needed and should be figured into the final cost.

Farwest Homes
928 Broadwater Ave
Billings, Montana 59102

Marvin F. Bell, Agent for pre-cut homes
1515 S 1
Hamilton, Montana

Banner Construction
1236 Helena Ave
Helena, Montana

Crafted Homes
Box 147
West of Miles City
Miles City, Montana

Key Modular Homes
603 Euclid Avenue
Helena, Montana

Modular Pacific Homes, Dealers
General Constructors
4999 Harrison Ave
Butte, Montana

BUYING A HOME

By

JAMES P. TWOMEY

And

SKIP SCHLOSS

It is pretty difficult to buy a home these days - particularly if you have a low or a moderate income. With the cost of home construction rising and with interest rates once again on the rise, the cost of a new home is usually beyond the reach of a family with modest income. However, there are some ways you can secure adequate shelter at moderate cost.

The first of these programs would apply if you live in a community of less than 10,000 or an area outside of the metropolitan boundaries of communities such as Great Falls or Billings. This program is the Rural Housing Loan Program (Section 502) of the Farmers Home Administration of the Department of Agriculture. If you have an adjusted family income of less than $12,900, you may be eligible to receive a loan directly from Farmers Home of up to $26,500. You would repay this loan over a thirty-three year period at the Farmers Home established interest rate, presently 9%. You deduct $300 for each dependent from your gross income to give you the adjusted family income.

What's the advantage of going through Farmers Home? Well, for one thing, you do not pay an origination fee to a bank or discount points to a bank. You also usually end up with an interest rate less than that charged by banks. However, Farmers Home will not loan to you if you can secure a normal bank loan. You have to be turned down by two or more lending institutions in order to receive a Farmers Home Loan.

What kind of house can you get? Ordinarily you can get a modest, 1,000 square foot house with three bedrooms and a full basement and carpeting throughout. In the event the house costs more than $26,500, you may be able to "paint your way in" by doing some of the work on the house yourself.

If your adjusted family income is $8,500 or less, you may be eligible for the Farmers Home Interest Credit Reduction payments which computes the mortgage at an interest rate as low as 1%, depending on your income. This reduced interest rate makes it possible for families of low income to be able to own their own home.

If you live within a community larger than 10,000 people, you may be eligible for housing assistance payments in certain rental units. There are at present home ownership programs in urban areas comparable to the Farmers Home Program. However, if your income is below that of the medium income for the area by at least 20%, then you may be eligible to reside in an apartment and only pay 25% of your income for housing. If your income is half of that, of the medium income established for the area, then you may be able to pay only 15% of your income for housing. This program - The Housing Assistance Payments Program, Section 8 - is administered by the Department of Housing and Urban Development. Allocations for housing units under this program in Montana have been made to Harlem, Roundup, Red Lodge, Bridger, Dillon, Troy, Malta, Forsyth, Fort Benton, Laurel, Billings, Helena, Butte, Great Falls and Anaconda. If you live in one of those communities, check with the mayor's office concerning projects which may be under way so that you can get on a list and be notified when units become available. You will have to be able to document your income and family size so that a determination can be made as to whether you are eligible to reside in one of the apartments.

If you are a Veteran and have a certificate showing your time of service which makes you eligible for a VA loan, you may be able to get a VA guarantee loan. The Veterans Administration does not make the loan, but will guarantee to the lender that in case you default, they will reimburse the lender for up to $12,500 of the loan. In many cases with such a guarantee, you may be able to move into a house with little or no down payment.

You may also be able to secure an FHA insured loan. To get such a loan ordinarily the seller has to pay "points" to a lending institution in order for you, the buyer, to get such a loan. While theoretically the seller pays, more often than not, it is built into the sales price, although that is supposed to be against the law. With an FHA insured loan, you may be able to get into a lower cost house with only a 3% down payment.

And there are those inevitable closing costs. Under a new Federal Real Estate Settlement Practices Act, the lending institution that is going to make your loan must inform you at least 12 days prior to your settlement, the costs which you will be expected to pay at closing. These costs may include a loan origination fee, an appraisal fee, prepayment of your insurance premiums for a year, possible proration of taxes, and possible legal fees. When you get this estimate of closing costs be sure to ask the lending institution should you have any questions. You also have the right to withdraw from the deal at that point if you find that you will not have the funds to meet these closing costs.

Be sure to shop around at banks, credit unions and savings and loans for the lowest interest rate that you can get on your mortgage loan. Not all lending institutions charge the same rate of interest and you will find that interest costs over twenty-five to thirty years and not the actual cost of the home will be the most expensive part of buying your home. If you need additional help, look to the Community Action Program, or the Human Resource Development Councils within your area. Local housing authorities, where they exist, may also be helpful. The newly created Montana Housing Finance Agency may also be a resource for you.

COLOR WORLD OF MONTANA INC
201 E Mendenhall Bozeman MT 59715